# ELECTRICAL WEST

THE ALL-INDUSTRY MAGAZINE OF PROGRESS

June 1939
10c a copy

## SEVENTH ANNUAL CONVENTION-IN-PRINT

McGraw-Hill Co.
of California

Air Conditioning News
CHAIN STORES ADOPT AIR CONDITIONING
COOLED AIR WHEN AND WHERE YOU WANT IT
SEE THE BIG SHOW
THE RIGHT WAY.. Install an Electric Evaporative Air Cooler
IN HOME, SHOP AND OFFICE
AH... THAT'S THE TRUCK!
HOW AN ELECTRIC
SOUTHERN
Nature-Conditioned Air, A Fact... Not a Theory

# *Edison Advertising*

## IS SELLING THE IDEA OF HOME AIR CONDITIONING

Selected districts in Edison territory are being covered intensively this season with newspaper and direct mail advertising on the subject of home air conditioning. All types of cooling systems are being featured—the evaporative cooler, the attic ventilator, the portable refrigerating unit and complete summer and winter air conditioning facilities. This year marks the beginning of a big swing toward the adoption of summer comfort cooling in the home. As always, the Edison Company will throw the weight of its advertising and promotion efforts in aid of this development.

6-39

**SOUTHERN CALIFORNIA EDISON COMPANY LTD.**

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), June, 1939, Vol. 82, No. 6. Published monthly by the McGraw-Hill Company of California, 883 Mission St., San Francisco, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, and Canada, $2 per year; all other countries $3 gold (thirteen shillings). Single copy 25c.
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# Street lighting COSTS LESS when you use G-E Form 79 Luminaires

## Here's Why

**80 PER CENT LESS GLASS BREAKAGE**

**Breakage on the tens of thousands of Form 79 luminaires in service (including 15,000 in New York City) is 80 per cent less than on fixtures not equipped with the spun-on globe. Figures are open for inspection.**

**SPUN-ON GLOBE KEEPS LUMINAIRES CLEAN, REDUCES MAINTENANCE**

**Form 79 luminaires in service for years have been inspected and found free of internal dirt. This is an important aid to efficiency and eliminates expensive cleaning operations necessary on luminaires which admit insects and dirt. "I've relamped Form 79 luminaires for three years," says one utility service man, "and I've never seen dirt on the inside."**

MANY thousands of units in service have proved that the Form 79 will operate at lower expense and higher efficiency than fixtures not equipped with the spun-on globe. The widespread confidence of operating companies in the Form 79 is shown by their extensive use of it in modernizing and extending street-lighting systems.

Examine the Form 79 yourself. Notice the stepped reflector, which redirects heat rays around the lamp filament, resulting in better lamp performance. Observe the new die-cast aluminum hood, standard on all Form 79's for both vertical and slip-fitter mounting. It is dust-tight with either internal or external wiring, and is used interchangeably with either radial-wave or enclosed reflectors. Look especially at the spun-on globe, secret of the Form 79's low maintenance record.

Then try Form 79 luminaires for your next installation. Compare globe replacement and other maintenance costs with those of other fixtures. See for yourself how you can save with the G-E Form 79. General Electric, Schenectady, N. Y.

SEE THE HOUSE OF MAGIC

**GENERAL ELECTRIC**

500-343

# BETWEEN THIS MONTH'S COVERS

## Presidents Speak

OPPORTUNITY (p. 45): It is too easy to fall into the habit of viewing our work as ordinary and thus overlook its immense opportunities. Before us lies the job of arresting mass murder on our highways. A far-sighted view of domestic electrical usage makes 2,000 kw.-hr. per home per year appear as a reasonable figure. That is the way A. E. Hitchner, PCEA president, looks at the industry's immediate future.

BONNEVILLE—AND REALISM (p. 46): Two general schools of thought hold sway in the Northwest. One group argues for a "postage stamp" power rate, aimed to carry Bonneville power over as great an area as possible by means of a far-flung transmission system. The other urges the cheapest possible rates at the dam in the hope of attracting some of the few industries in which power is a significant part of the cost of the finished product. In such an atmosphere, the Northwest utilities are proceeding with the realistic job of maintaining first class service to their customers and remaining in readiness to help dispose of Bonneville energy. The situation is analyzed by LeRoy Grettum, president of the Northwest Assn.

## Spotting Bombers

DEFENDING THE PACIFIC COAST (p. 53): The modern military plane flies fast. Therefore, attacking planes must be observed and identified far from centers of defense in order that defending forces can prepare for action and in order that civilian populations may be warned. Such a scheme of defense involves a far-flung system of communications. Along the West Coast, electric utilities have volunteered their assistance to the Army. Their communications systems have fitted very satisfactorily into the Army's plans. The author is Col. L. H. Stanford, Signal Corps, Ninth Corps Area.

## Selling Study

DO DEALERS WANT SALES TRAINING? (p. 57): When dealers themselves were asked this question, 275 said yes, and 38 said no. Asked if they would pay a nominal amount per salesman for such additional training, 143 said yes, and 102 said no. Asked if they wished the utility to give further assistance to training salesmen in regard to company services, 244 said yes, and 19 said no.

## Buying Too Cheap

WHO PAYS THE REPARATIONS FOR PRICE WARS? (p. 59): Purchasing below cost often amounts to a form of sabotage. If such a purchaser were to look beyond his immediate transaction, he would see that he is thereby lowering standards of business conduct, is helping to turn healthy competition into a destructive conflict, and is thereby, in the long run, contributing to the destruction of his own source of supply. This logic was advanced seven years ago, and now again, by E. F. Watkins, who is manager of purchases for Southern California Edison Co.

## Annual Reports

NORTHWEST ASSOCIATION (p. 71): Through most of the year engineering, operating and commercial men of the Northwest systems have been conducting studies to promote economy and efficiency in their individual tasks. The annual reports are the results of these studies.

## Annual Meeting

INDUSTRIAL DEVELOPMENT OF THE WEST—( p. 165): Three western associations joined in a convention to explore the possibilities for pushing the industrial frontiers further in this direction. Pacific Coast Electrical Assn. was host to 700 conventioneers, and to representatives of the Rocky Mountain Electrical League and the Northwest Electric Light & Power Assn. The theme was developed by speakers representing western industries—such as aviation—by those who are organizing to bring more industry westward, by prominent industry electrical leaders from the east, yes, even by weather, (sometimes known as climate, and one of the West's greatest assets to offer industry.) Combined also with the convention was the final conclave of PCEA in which committees appointed to study and solve, if possible, certain industry problems held final meetings and wound up their year's work. B. F. Weadock, managing director of Edison Electric Institute brought encouraging and inspiring word that the tide of condemnation is turning to a new appreciation of what private business means to America and its future.


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Cover: Presidents of the big three among electrical associations in the West (left to right): LeRoy Grettum, Northwest; A. E. Hitchner PCEA; W. N. Clark, Rocky Mountain. An Electrical West photograph from figures by A. O. Dinsdale, San Francisco

## What's Doing

NEWS OF THE INDUSTRY (p. 176): San Francisco rejected municipal electric distribution for the eighth time . . . . Frank A. Banks, construction engineer at Grand Coulee, appointed acting Bonneville administrator . . . . Boulder Dam is really Hoover Dam . . . . Puget Sound Power & Light declares it is not going to sit by while scattered condemnation proceedings threaten to cut the system into small pieces . . .

## In May

Mighty pleasing to the ELECTRICAL WEST staff has been the deluge of letters from subscribers who were taken with our cover picture last month—the one showing the Southern California Edison lineman and boys with kites. So we've had some proofs of the cover struck—just the picture without the over-printed masthead—and these are available upon request, while they last. —ED.

## For July

NEXT MONTH: An ingenious protection scheme affords a combination of possible services over duplicate lines to KNX broadcasting station in southern California. How this reliable service is achieved will be described in detail in the engineering section. A rural article will tell how turkey growers have profited and how a utility has gained high-load-factor customers by means of keeping flocks under lights. Really valuable and practical tips on selling the electric kitchen will be the subject of the sales guide.

# The Burndy SERVIT

## Permanently Secure

## UNDER *ANY* SERVICE CONDITIONS

**BURNDY "UNIT" SERVIT Type KSO**

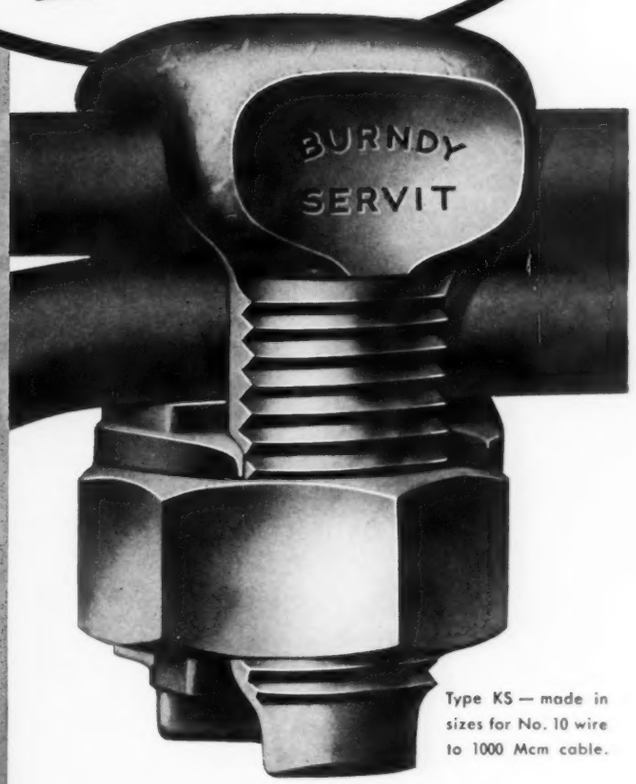
Linemen like it because the nut retainer prevents the nut-pressure bar assembly from becoming lost during installation.

**BURNDY BUTTIN—Type KP**

A sturdy, inexpensive connector; ideal for all end-to-end connections on small conductors where there is no tension. Speedily installed with pliers or screwdriver.

**BURNDY BUTTIN Type KPM**

The curved saddle prevents direct set-screw pressure on conductors. Listed by Underwriters.




Type KS — made in sizes for No. 10 wire to 1000 Mcm cable.

Because of their higher frictional efficiency, Servits make the most of every inch-pound of applied torque. The result is a high-compression contact . . . permanently secure under the most severe operating conditions!

# BURNDY

## ENGINEERING COMPANY, INC.

459 EAST 133rd STREET • NEW YORK CITY

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C. E. Ingalls, San Francisco
F. W. Carlson, Seattle
Peterson Company, Denver

The Blackburn Hinge-type nut retainer is completely concealed within the nut, and has no extending parts to interfere with taping. The nut swings out of the way for installation, and hinges back into place in perfect alignment with the threads.

*Specify*
**BLACKBURN CONNECTORS**
*You will like them*

**JASPER BLACKBURN PRODUCTS CORP.**
Main and Clinton Sts. St. Louis, Mo.



**NEW INDUSTRIAL SIGNAL**

The **FEDERAL**
**RESONATING HORN**

A powerful distinctive electric horn for industrial fire alarm, call system, or warning signal applications.
Produces a resonant penetrating tone, similar in quality to a compressed air, or electric air, whistle.

*Yes, like other Federal Horns, it is*
ECONOMICAL
POWERFUL
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**FEDERAL ELECTRIC CO., INC.**
CHICAGO NEW YORK


# NEW PRODUCTS

## Tape (651)

New combination friction and rubber tape, known as U.S. Twinsulation tape, and adaptable to all kinds of electrical work has been introduced by U.S. Rubber Co. The company says that all the advantages found in both friction tape and splicing compound have been incorporated in this one product. "Due to Twinsulation's high dielectric strength," the announcement says, "less tape need be applied than is the case with ordinary commercial friction and rubber tape. A splice made with two plies of the tape will withstand a test voltage of approximately 12,500 to 15,000 volts."

## Infra-Red Ray Lamps (652)

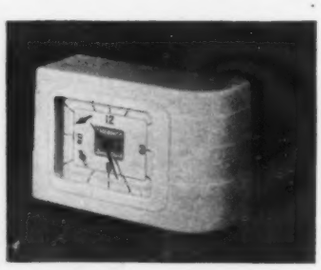
Dritherm is the name under which the newly improved North American Electric Lamp Co.'s infra-red red lamp is being marketed. These lamps are especially made for radiant drying and heating purposes. Several test applications have been made and proved out. Long burning life in proportion to high efficiencies obtained; uniformity of filament materials, as well as placement of carbon filament within the bulb, and rugged construction to minimize breakage are several features claimed by the company.

## Kelvinator Washers (653)

Three mechanical innovations highlight Kelvinator's line of washers. Topping the line of advancements is the "Fabric-Saver Wringer with Pressure Pilot." With this device, the user operates a control at the outer end of the wringer assembly which shows the correct setting of pressure for each fabric. The words "wool" or "silk-rayon," etc., appear in an indicator opening as the handle control is set. The "Fin-Flex Agitator" is designed with two large and two smaller curved fins which give complete washing action in every part of the tub. The third big improvement is a silent-mesh transmission, a mechanism with only five moving parts.

## Timer Clock (654)

Similar to the 1938 timer clock, which could be used with Everhot roasters and other appliances to turn the current on and off, or off only, at any time within a 11½-hr. period, is the new Everhot deluxe timer clock introduced by Swartzbaugh Mfg. Co. There is,



however, one additional convenience: a control knob which permits instant switching from automatic to manual control or reverse. With the new model it is not necessary to disconnect the clock to return to manual control, or to reset the clock in order to regain manual control of the appliance. With the mere flip of a knob the clock is set for automatic control, or for direct flow of the current through the clock to the appliance.


**REAL RELIABILITY**

**JEFFRIES**

**LARGE SIZE**
**AIR COOLED TRANSFORMERS**

● Features that will save you money are to be found in large Jeffries air cooled indoor distribution transformers from 10 kva. to 50 kva. capacity. Well ventilated sheet steel cases and large air ducts in coils eliminate all hot spots and assure dependable continuous, and economical performance. Case construction is simplified for easy, quick installation. Write us today for details.

**JEFFRIES TRANSFORMER COMPANY**
5706 Long Beach Ave. Los Angeles, Calif.



*Ideal Banking Service* **FOR SALESMEN**

Traveling men, salesmen — men and women whose jobs prevent their calling at the bank in person, find our BANK-BY-MAIL Service ideal. They do their banking when most convenient, night or day and wherever there is mail service. Prompt. Reliable. Overnight to most points in California.

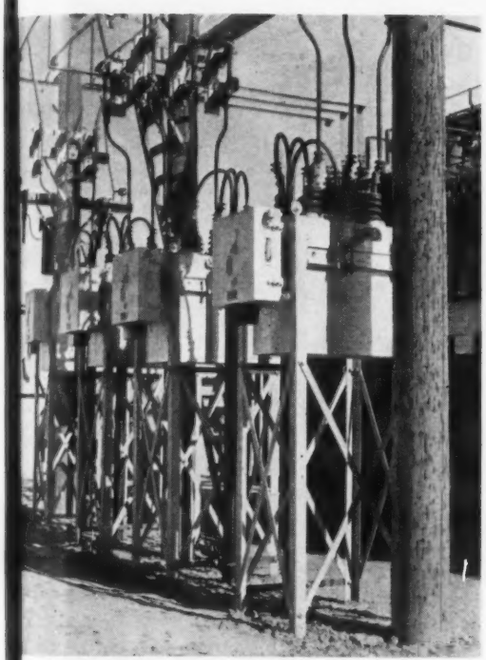
*Write today...*
for free Bank-by-Mail kit containing all necessary forms, return envelope and simple instructions.

**CROCKER FIRST NATIONAL BANK**
OF SAN FRANCISCO
*California's Oldest National Bank*

*Member Federal Deposit Insurance Corporation*

# Say Goodbye to EXPENSIVE *Extras*

## WHEN YOU BUY OIL CIRCUIT BREAKERS



Four Pacific Electric Type AKE breakers in 4000 kva. substation serving the Gayway at San Francisco Exposition. Reliability of service is assured.

*Have Reliable Circuit Protection, Few Outages and More for Your Money!*

**Type AKE, 7.5 and 15 kv.**

At last—you can have reliable circuit protection and full revenues from pay loads without expensive "extras" when you buy breakers!

For Pacific Electric engineers made exhaustive field studies, looked over your situation and cut unnecessary costs through improved design.

Now you can say, "Goodbye to costly field assembly," for these breakers are shipped factory tested and assembled *as a single unit.* You have no expensive operating power supply as with cheaply-designed breakers, for our Motor Control is factory mounted on the breaker and operates from small batteries or low-source AC without rectifiers. Accessories, such as Relay Panel and Battery Units, are available for mounting on the breaker frame. That permits our economical factory mounting and wiring.

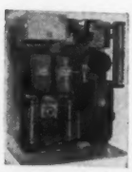
You owe it to *your* company to get the *full* money-saving advantages of Pacific Electric breakers.

### LOW MAINTENANCE

Now consider their maintenance cost. You have low oil carbonization, less oil testing and servicing, less arcing-tip burning, certain synchronizing, easy inspection, no costly delicate adjustments because P.E. breakers, unlike ordinary breakers, are *properly designed* and built for reliable low-cost service.

### Sure Control Mechanisms

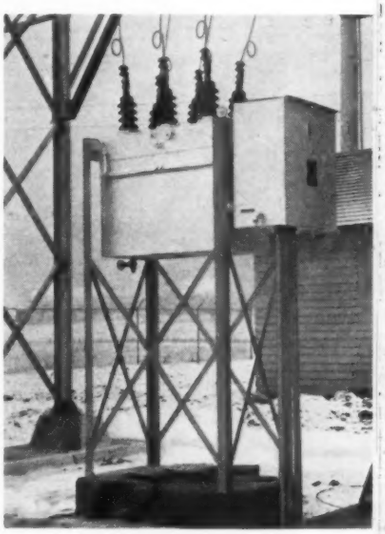
Here you see the spring-actuated Motor Control. It is suitable for automatic reclosing with either immediate or delayed first reclosure with time delay for second and third reclosures. No unreliable rectifiers. Operates from small batteries or low-power AC source.



Hand-operated Control trips automatically but must be closed by hand. Factory mounted on breaker to save you money. Both controls are safe and sure. Get all the facts.

### *Good News for You*

These Pacific Electric breakers have our exclusive Expulsion Chamber Arc Extinguishing Devices which permit fast opening and closing of circuits. They cut oil carbonization by quenching arcs quickly. That also reduces arcing-tip burning, ends oil throw and fire hazards which may occur with poorly-made breakers. Get full money-saving facts now.



### PLUS *Safety*

The extra benefits you get with Pacific Electric breakers assure you of SAFETY. You have sound design. That alone offers safety. However, these breakers offer fast clearance of faults because of rapid arc clearance and positive operation—that gives added safety.

Utilities that try one and buy more know these breakers are manufactured with precision, and are made of the most reliable and suitable materials by a concern that *specializes* in line-protection equipment.

### THIS SOUND ENGINEERING ASSURES YOU OF A BETTER BUY

Send now for our complete proposal and full technical details. Then put one of these AKE breakers (7.5 or 15 kv.) on a "tough" circuit and you will be convinced of their superb performance, just as scores of other utilities are.

You will rely upon their Bushing-Type Current Transformers, their radio "test free" performance, their solid-type Bushings and other added values that only Pacific Electric gives you.

### *Saves Space*

Just look at the compact design which saves station space! Installation in Idaho of AKE-40 with MJ-1 Motor Control.

WRITE NOW FOR BULLETIN NO. 63

## Pacific Electric Mfg. Corporation

5815 THIRD ST., SAN FRANCISCO — DUNES HIGHWAY, GARY, INDIANA

Representatives in Principal Cities

Reliable

STRAIGHTLINE SPLICES

High in strength -- Low in cost -- Positive in performance. Ends fit wire closely, dampening vibrations and preventing insertion of improperly prepared wires. A husky slotted washer maintains spacing of jaws preventing a strand from wedging between them. Jaws grip wire positively without cutting lines in it.

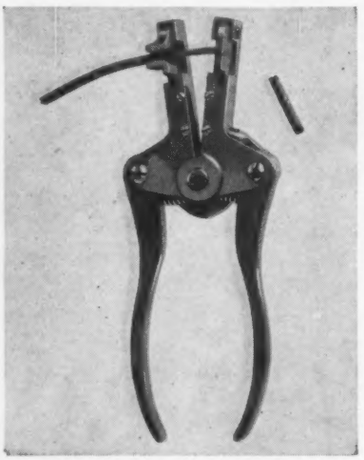
Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES
3145 CARROLL AVENUE • CHICAGO ILLINOIS


### Water Heater (655)

Servhot is Swartzbaugh Mfg. Co.'s new 1½-gal. water heater. Complete with chrome faucet and other fittings, the heater is designed for easy installation on wall brackets. It plugs into any 115-volt, 1,320-watt a.c. wall outlet. Although rated at 1½ gal., the maker says that the actual usable quantity of normally hot water available is in excess of this amount if the temperature dial is kept at "high." If the entire tankful is drawn off at one time, 100% temperature recuperation occurs in 15 to 20 min.

### Wire Stripper (656)

Specialty Mfg. Co., skins and cuts solid or stranded wire in sizes from No. 12 through No. 20. The company says it saves time and work because it is simple to use and does a



quick, smooth job. Only operation is to place wire in the stripping jaws and then squeeze handle together. Jaws and cutting blades are hardened steel; springs are music wire; all screws are case hardened, and the tool is finished in dull nickel.

### Phasing-Out Voltmeter (657)

Designed particularly for use in phasing out power-distribution circuits is a new General Electric portable high-resistance voltmeter. Basically the unit consists of an instrument connected in series with a small neon lamp and two high-voltage resistors that are treated to assure stability together with immunity to the effects of varying atmospheric conditions. A transparent plastics tube houses the component parts. Indicating instrument used is a rectifier-type milliammeter. Shunted around the instrument is a suitable resistor, so that should an open circuit develop, the neon lamp would continue to glow if voltage were present. Because of this arrangement, all the voltage is applied to the neon lamp until it starts to glow. This permits checking the operation of both the neon lamp and the instrument on voltages as low as 110 volts. Special emphasis has been placed upon safety features of the product: An approximate indication of the magnitude of the impressed voltage is shown by the indicating instrument; the neon lamp glows at all voltages above 110 volts.

### Weatherproof Sockets (658)

New line of weatherproof sockets which stop corrosion in all weather has been announced by Arrow-Hart & Hegeman. The one-piece socket hood is die cast, of a zinc-base metal, and is available with ½-in. straight or angle cap for 2¼-in. shades, or ½-in. without shadeholder. Sprayed aluminum finish is standard, but green finish can be furnished without extra cost.


A GRIP FOR ALL NEEDS

*No. 1628-5 B. "Chicago" Grip. Maximum opening .563. Minimum opening .115. Safe Load, 8,000 lbs.*

**Here's the new "Chicago" Grip capable of handling messenger or guy strand from 3/16 in. diameter up to ½ in. diameter. A genuine all purpose grip that can also be used satisfactorily on bare conductors, solid or stranded, from No. 6 to No. 4/0 seven strand copper and A.C.-S.R. up to No. 3/0. A grip that even satisfactorily handles the new three-strand "copperweld" conductor. The bronze-lined jaws prevent slippage. This new grip will afford a sure hold under all conditions, with loads up to 8,000 lbs.**

**DISTRIBUTED THROUGH JOBBERS**

**Foreign Distributor: International Standard Electric Corp., New York**

**The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:**

- ☐ Safety for the Pole Climber.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ The Safety Factor on Linemen's Leather Goods.
- ☐ Pocket Tool Guide.

Mathias KLEIN & Sons
Established 1857 Chicago, Ill. U.S.A.

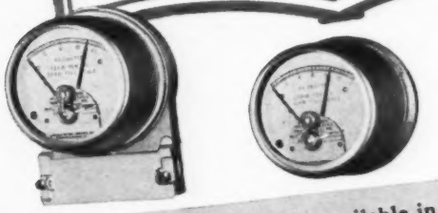
# THE RECORDS SHOW THAT

Lincoln Meters Lincoln Meters

DURING THE PAST TEN YEARS MORE THAN 75,000 LINCOLN DEMAND METERS HAVE GIVEN PRACTICALLY MAINTENANCE FREE SERVICE . . .

Lincoln Meters

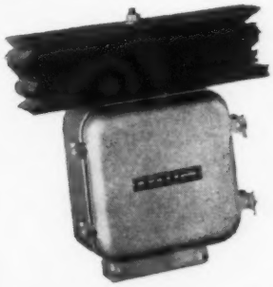
- FOR BILLING PURPOSES

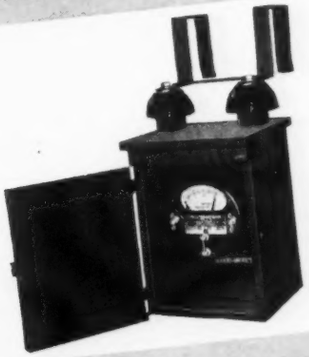


A complete line of single and polyphase demand meters available in graphic and indicating types; bottom connected or socket mounting.

Lincoln Meters

- FOR CHECKING DISTRIBUTION TRANSFORMERS

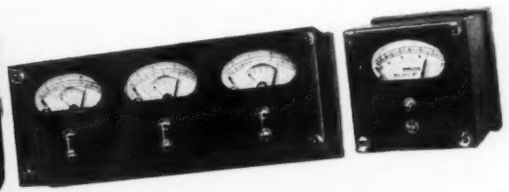




These graphic and indicating demand meters for pole mounting provide economical insurance against overloaded line equipment.

Lincoln Meters

- FOR SWITCHBOARD APPLICATIONS



Furnished in a wide variety of graphic and indicating types (built-in instantaneous ammeters, optional) for all substation purposes.

**LINCOLN METER COMPANY**

SPRINGFIELD, ILLINOIS

# We Thank You Electrical Folks for the Excellent Business B-M Fittings Enjoy On the Pacific Coast!

All users find B-M Fittings indispensable after one trial. No complicated installation troubles, no fussing with nuts to tighten, no lost time. The satisfactory results and the savings realized on each job is one of the reasons for the almost universal popularity. B-M Fittings are so reasonable in price that the savings on your first job will more than pay for the Indenter which is the only tool necessary to make a perfect installation. Ask your Wholesaler for details or write our distributors.

Our method and tools are patented and we limit the use of our tools under these patents to the installation of our fittings only.

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CONNECTOR

Distributed by
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CLAYTON MARK & CO.
Evanston, Illinois
CLIFTON CONDUIT CO.
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GENERAL ELECTRIC CO.
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THE STEELDUCT CO.
Youngstown, Ohio
ENAMELED METALS CO.
Pittsburgh, Pa.
NATIONAL ENAMELING & MFG. CO.
Pittsburgh, Pa.
TRIANGLE CONDUIT & CABLE CO.
Elmhurst, New York City

*No. 605*

**B-M INDENTER**

Two squeezes on the handles of the B-M Indenter and the B-M Connectors and Couplings are securely fastened to the Electrical Metallic Tubing.

**BRIEGEL METHOD TOOL CO.**
*Not Incorporated*
GALVA, ILLINOIS

STEEL STRAND ❖ TELEPHONE WIRE

# Crapo
GALVANIZED PRODUCTS

## SPECIFIED BECAUSE OF PROVED PERFORMANCE

*Crapo* Galvanized Steel Strand has earned its enviable reputation for long, dependable, economical life by outstanding performances in actual service. That's why it so often is specified by leading utilities for the more important construction jobs. The heavy, uniform, pure zinc coating—applied by the *Crapo* Process—is notable for its adhesion and ductility; its ability to withstand bending and twisting; its lasting resistance to corrosion. Both the finished strand, and the wire from which it is made, conform in every detail to the most rigid specifications for tensile strength, elongation, size, galvanizing and ductility.

*Crapo* Galvanized Strand is readily available in all standard grades and sizes. Ask your Jobber, or write direct for technical details!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA


## Air Circuit Breakers (659)

"De-ion" air circuit breakers designed for circuit protection of main distribution feeders in central stations, industrial plants or building equipments where heavy concentration of power requires a breaker of 20,000-amp. interrupting capacity have been announced by Westinghouse. They are available in wire-size ratings of from 70 to 600 amp. and for voltages up to and including 600 volts on a.c. or 250 volts on d.c. Newly developed silver-alloy contacts are said to assure positive contact and long life, and provide maximum protection against "welding" on heavy short circuits. In addition to thermal trip elements calibrated with inverse-time characteristics, the breakers have instantaneous magnetic trips which operate at from 9 to 10 times thermal rating, supplementing the thermal trip elements to provide instantaneous tripping on short circuits where inverse-time-limit characteristics are not desired.

## Exhaust Fan (660)

Because it is powered by a heavy-duty, ball-bearing, ¼-hp. motor, a new 24-in. bucket-blade exhaust fan announced by Signal Electric Mfg. Co. . is said to exhaust against a very strong wind pressure. The frame is of steel

construction with all joints welded. Blades of the steel fan are reinforced. Special thrust-type ball-bearings permit mounting of the motor in a vertical position. Housing is totally enclosed. For single-phase a.c., the motor is a capacitor type, rubber mounted.

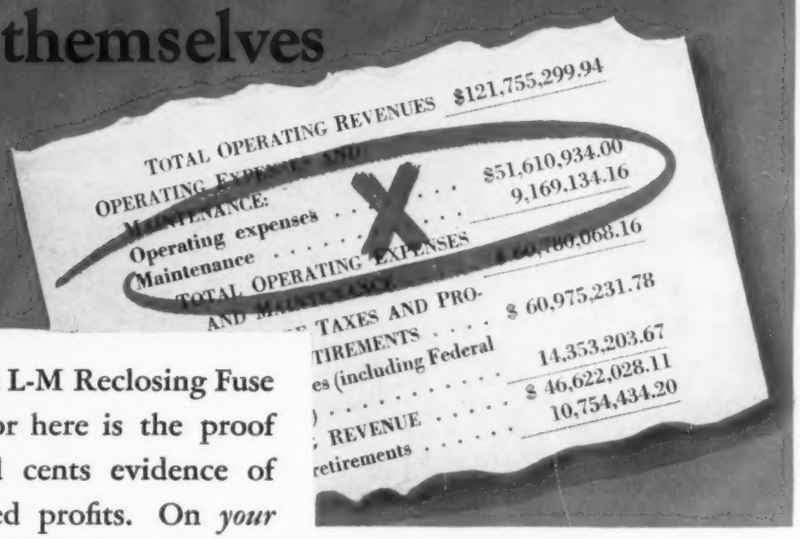
## Glow Lights (661)

An unusual development in decorative home illumination is made possible through Aerolux Light Corps's Kayatt glow lights. Sealed within electric bulbs are embossed replicas of flowers, animals, comic characters, etc. When current is turned on, these figures fluoresce to a soft iridescent glow. The lights do not depend upon the incandescence of a filament for emission of light, but operate on a principle of electronic ionization of rare air vapors. They operate on 100 to 120 volts and consume about 1 to 5 watts. The lights are available simply as bulbs or as flower pots and vases (the bulb extending out of a pot).

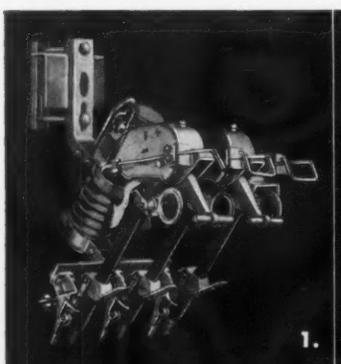
## "Select-O-Speed" Transmissions (662)

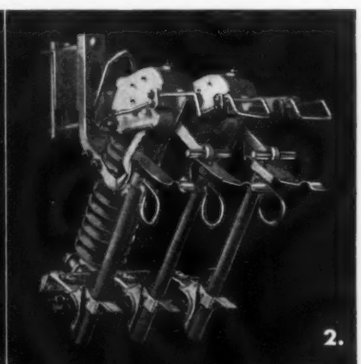
New series of "Selecto-O-Speed" transmissions with hand wheel control has been announced by Ideal Commutator Dresser Co. The models supplement the standard line, from fractional to 7½-hp. capacity, equipped with lever-type control. The hand wheel is recommended where finer speed adjustments and smaller increments of speed are necessary. By turning the wheel only a partial turn it is easy to change the speed only a few revolutions per minute. This type of control is especially desirable for installations requiring remote control. Hand wheel control is available on variable speed transmissions from 1½- to 7½-hp. capacity.

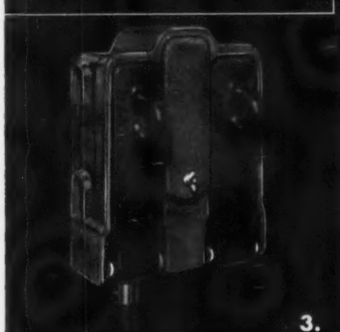
# X marks the spot where L-M Reclosing Cutouts Pay for themselves




In utility financial statements L-M Reclosing Fuse Cutouts "rest their case". For here is the proof that counts, the dollars and cents evidence of decreased costs and increased profits. On *your* lines, too, L-M Reclosing Cutouts assure decreased outage losses, fewer troubleman's trips, increased profits per Kilowatt-Hour, improved customer relationships . . . that's how L-M Reclosers save you money and trouble, and *pay for themselves.*




**1. TYPE RLO**
5000, 7500/12500, 15000 V.
50 and 100 Amp.

**2. TYPE RLD**
5000, 7500/12500, 15000 V.
100 Amp.

**3. TYPE RP2-56**
5000 Volts — 50 Amp.

## Get These L-M Reclosing Features:

**FULLY AUTOMATIC OPERATION** . . . nothing to "cock", nothing the lineman must remember to do, and impossibility of two fuses being in parallel.

**UNMISTAKABLE INDICATION** . . . L-M Reclosing Cutouts have only two positions, the normal "Up" position and the "Dropout" position, no confusing third or intermediate position. One quick glance from the ground tells the exact condition of the cutout.

**FIRM, SURE CONTACTS** . . . L-M Cartridges are positively latched in the "Up" position. They cannot drop out of contact due to vibration. They are "Up" till the fuse link blows.

**BELLOWS TIME DELAY** . . . insures a fault-clearing time lapse between opening and reclosing the circuit, prevents needless blowing of a second fuse.

Standardize on L-M Reclosing Fuse Cutouts . . . they pay for themselves.

# LINE MATERIAL CO.

THERE ARE "BESTS" IN EVERY INDUSTRY

IN ELECTRICAL APPLIANCES IT'S

Sunbeam

*Automatic* MIXMASTER
*Double Automatic* IRONMASTER
SILENT AUTOMATIC TOASTER
*Automatic* COFFEEMASTER
SHAVEMASTER
FLAT TOASTER • FAN HEATER
GLASS COFFEE MAKERS
WET-PROOF HEATING PAD
MASTER PLUG & CORD SET

MADE AND GUARANTEED BY
CHICAGO FLEXIBLE SHAFT COMPANY
5600 West Roosevelt Road, Chicago, Ill.
316 Commercial St., Los Angeles, Cal.
1619 Shenandoah Dr., Seattle, Wash.
224 S. W. Temple St., Salt Lake City, Utah
49 YEARS MAKING QUALITY PRODUCTS

WIRING THAT PASSES INSPECTION *Quick*

WIRING O.K. ELECTRICAL INSPECTOR

IDEAL Wire-Nuts

Wire inspection is just a quick routine matter when **Ideal** "Wire-Nuts" are used. Make safe, dependable and economical wire connections. Here are a few of the reasons:
**A Permanent Joint**—Heat-resistant molded-shell is puncture-proof at 10,000 volts!
**Better Electrically—Stronger Mechanically**—Non-corroding, self-made threads are pressed into wires, increasing conductivity. An **Ideal** "Wire-Nut" joint will withstand almost **3½ times** more pull than the best soldered joint.
**Easy And Convenient To Use**—Strip wires—twist on "Wire-Nut"—**That's All!** No solder, tape, blow torch, special tools or twisting of wires required.
**Sizes For Every Job**—Ideal "Wire-Nuts" are made in sizes to fit all common wiring joints, for solid or stranded wires.
**Fully Approved**—Listed by Underwriters' Laboratories, Inc.

SAMPLES ON REQUEST

ELECTRICAL PRODUCTS DIVISION
**Ideal Commutator Dresser Co.**
1042 Park Avenue Sycamore, Illinois

# PRODUCT DATA

**Free to you . . . Any of these instructive bulletins simply by addressing a post card to ELECTRICAL WEST and asking for the desired bulletin by number.**

**601:**
"The Improved Station-type Induction Regulator" is a new publication issued by General Electric Co. Introducing the latest member of a family of regulators covered by the "8-Point Plan," this bulletin presents a regulator suitable for both indoor and outdoor service, for voltage regulation on 2,400 and 4,800-volt circuits. Advantages to the user are stressed, and various illustrations with details and diagrams make this publication complete and interesting. Write for No. 601.

**602:**
Signaling is as old as the hills. Patrick & Wilkins Co., Philadelphia present their new attractive catalog "Signaling," showing their complete line of annunciators, burglar alarm devices, bells, buzzers, chimes, sirens, intercommunicating telephone systems and other forms of call systems. This catalog marks the "Today" of this company which helped Thomas Edison design his first phonograph. Be sure to send for No. 602.

**603:**
New indoor daylight for factories is the subject of a catalog presented by The Miller Co., makers of fluorescent lighting fixtures. Announcing new three-light and 48-in. fluorescent daylight reflector units for industrial application, this new bulletin outlines the benefits of fluorescent Mazda light, shows how Ivanhoe fluorescent fixtures are constructed to simplify installation and maintenance. The junction box at the top of each reflector is also featured. Write for No. 603.

**604:**
"Itelite circuit breakers" is one of the many I-T-E publications listed by the I-T-E Circuit Breaker Co. This general catalog lists type ET breakers for load centers, power panels, panel boards, switchboards and individual mounting. Prices, types, dimensions, operating characteristics and continuous ratings are included in this bulletin. Send for No. 604.

**605:**
Leeds & Northrup Co., Philadelphia, have announced a combination indicating recorder and automatic frequency controller which is suitable for all but the largest central stations on interconnected systems. Complete information on this new, simpler equipment, the "Micromax" type, is now in catalog form. Write for No. 605.

**606:**
Photo-electric equipment is commanding considerable attention today. Lipman Engineering Co. have developed a PC-3 high-speed photo-electric counting equipment, which they have outlined and illustrated in an attractive brochure. This new equipment is capable of 600 counts per min. or 36,000 counts per hour. Write for No. 606.

**607:**
The revised edition of "Engineering Properties of Monel" has been released by The International Nickel Co. This 12-page descriptive bulletin defines and outlines Monel, and describes the mill products of this alloy. Write for No. 607.

**608:**
The measure of flow, level, pressure and temperature at a distant point are accurately transmitted, indicated, recorded or integrated by the Bailey Meter Co.'s "Synchro-Meter," according to a new bulletin on this simple electrical mechanism. This points out that metering equipment operating on this principle has accuracies equivalent to mechanically operated metering equipment, that the system is not affected by an ordinary variations in voltage or power factor. Wiring diagrams are included.

**609:**
"Enclosed indicating and Dropout Fuse Cutouts" is a 10-page General Electric bulletin which outlines and illustrates these units, showing how they operate, their construction features, and the method of testing such equipment in the G. E. Pittsfield Works. Ratings, prices, weights and dimensions are also covered. Clip the coupon and ask for No. 609.

**610:**
"The Answer on Radio Interference" is explained by R. Thomas & Sons Co. in their new folder, illustrating the "Thomas process." The problem of radio interference is discussed, and the various types of Thomas insulators outlined in diagram form. If static spoils your radio programs, write for No. 610.

**611:**
The Glass Coffee Brewer Corp., makers of the "Cory" Coffee Brewer, have issued a catalog announcing their new type of brewers. Wide-necked decanters allow for easy cleaning and new fittings, handles, hinged cover are new developments. In addition to the "Fast-Flo" filter, new Cory models are also supplied with a glass rod filter. Check No. 611 and read about them.

*(Continued on Page 14)*

When requesting more information on New Product and Product Data items cut out this coupon, paste it on the back of a postcard and mail to

**Electrical West**
**883 Mission Street**
**San Francisco, California**

**Please send me the following CHECKED items:**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| New Products: | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 |
| | | | | | 659 | 660 | 661 | 662 |
| Product Data: | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 |
| | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 |
| | | | | | | | 617 | 618 |

Name .....

Address .....

.....

*This is the Teletalk Stamp Book. Ask your Graybar salesman to show you how to use it for easy selling*

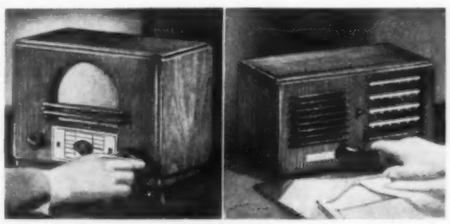
# System Layouts are Easy to Make with this Stamp Book

The increased need . . . and demand . . . for inter-communication in every line of commerce, business and industry opens a new profit opportunity for the electrical trade . . . Teletalk, the new, modern method of inter-communication, enables you to sell every line of business . . . both large and small. The profit on the sale of Teletalk is good . . . and there is a plus-profit in the installation and the sale of material. This makes it an ideal selling proposition.

Most important of all, it opens up a new, untouched market. Retailers, jobbers, public and commercial buildings, and industrial plants . . . all are prospects for Teletalk. And Teletalk is easy to sell. The plan above is typical of the method you can employ. The Teletalk Stamp Book illustrated here makes it easy for you to lay out similar floor plans so your prospect can see just what he is getting.

There are five different Teletalk models . . . in two different circuits . . . that permit as large or as small a system as your customer desires. Every possible combination is available. Talk with your local Graybar salesman about Teletalk. He can show you how to make money with it.

•



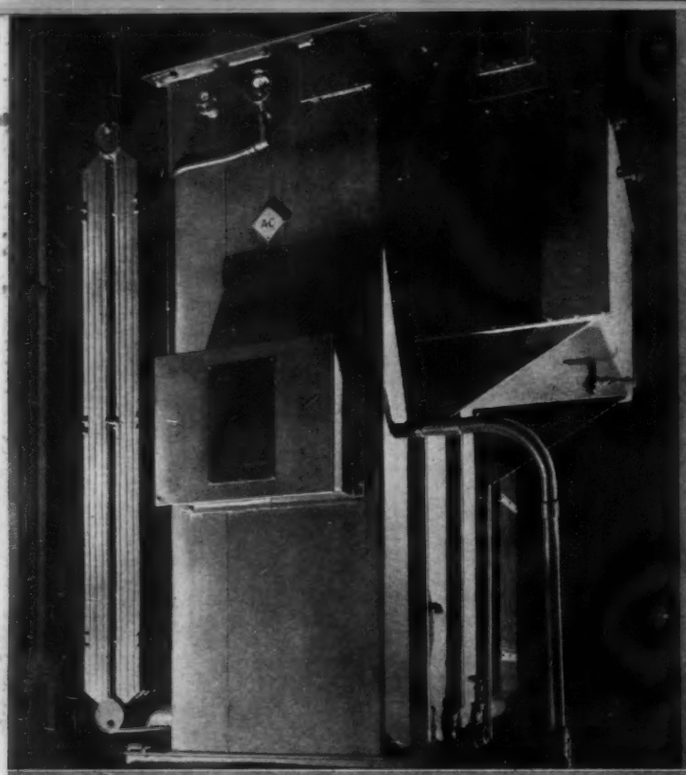
*The model illustrated at the right is the Model 224. It has a capacity of twenty-four stations. At the left is Model 105. It has a capacity of five stations*

*Licensed by Electrical Research Products, Inc. under U. S. Patents of American Telephone and Telegraph Company and Western Electric Company, Incorporated*

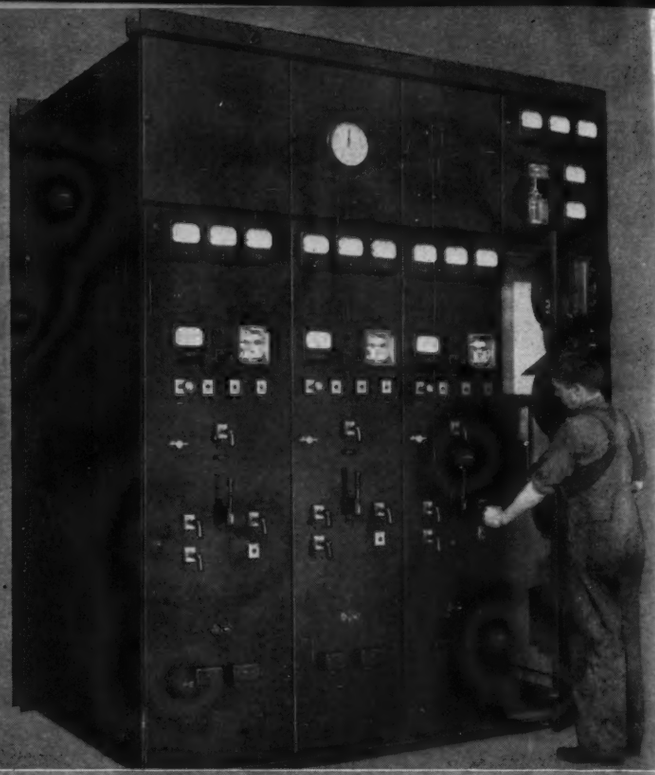
WEBSTER ELECTRIC COMPANY
RACINE, WISCONSIN, U. S. A.
Export Dept.: 100 Varick St., New York
Cable Address: "ARLAB," New York

# Webster Electric

*"Where Quality is a Responsibility and Fair Dealing an Obligation"*



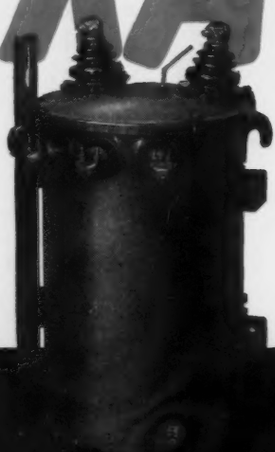
LONGER CONTACT LIFE... Lower Exciting Current... Smoother Regulation of 5/8% Half-Cycling Steps... add up to give this utility lower operating costs... increased customer satisfaction with their Allis-Chalmers 5/8% Half-Cycling Step Feeder Voltage Regulators. Write for your copy of Bulletin 1170-C.



COST-CUTTING SERVICE plus complete protection make Allis-Chalmers Vertical Lift Metal-Clad Switchgear a favorite with utilities that are looking for positive cost-cutting protection for their equipment and their workers. Send for Bulletin 1192. Shipped pre-tested and assembled, Allis-Chalmers Metal-Clad is ready to work for you the minute it's installed.

# HERE'S WHERE EXTRA PROFITS START!

SURGE PROTECTION... positive prevention of failure due to lightning... makes Allis-Chalmers Distribution Transformers the safest for your distribution system. Bulletin 1173 gives the whole story. Write for your copy today!



SALT LAKE CITY, UTAH — KEARNS BUILDING
LOS ANGELES, CAL. — ROWAN BUILDING
PORTLAND, OREGON — 1311 S. E. UNION AVE.
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PHOENIX, ARIZONA — LUHRS TOWER
SEATTLE, WASH. — HENRY BUILDING
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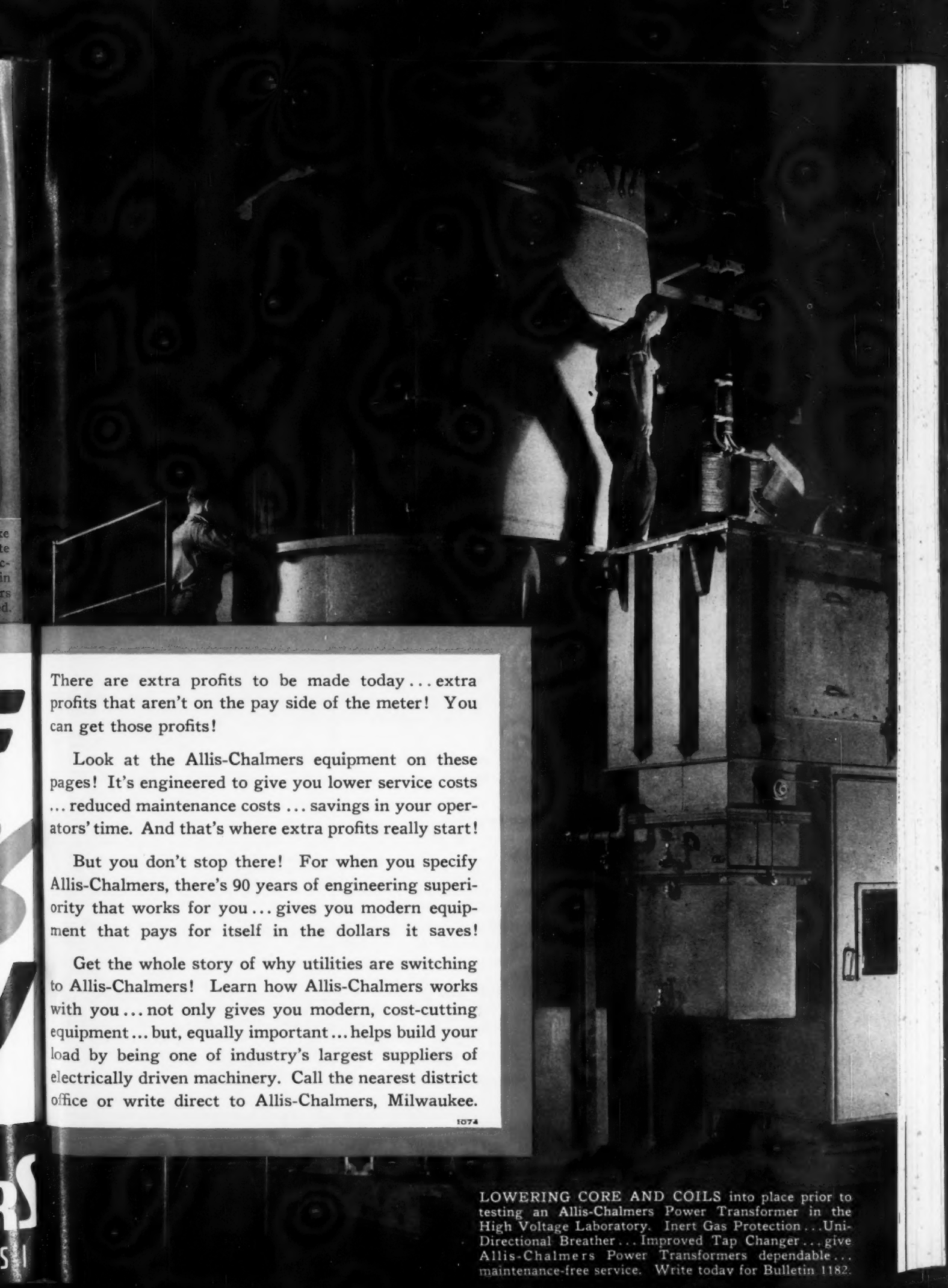
ELECTRICAL DIVISION
ALLIS-CHALMERS
MILWAUKEE · WISCONSIN



There are extra profits to be made today . . . extra profits that aren't on the pay side of the meter! You can get those profits!

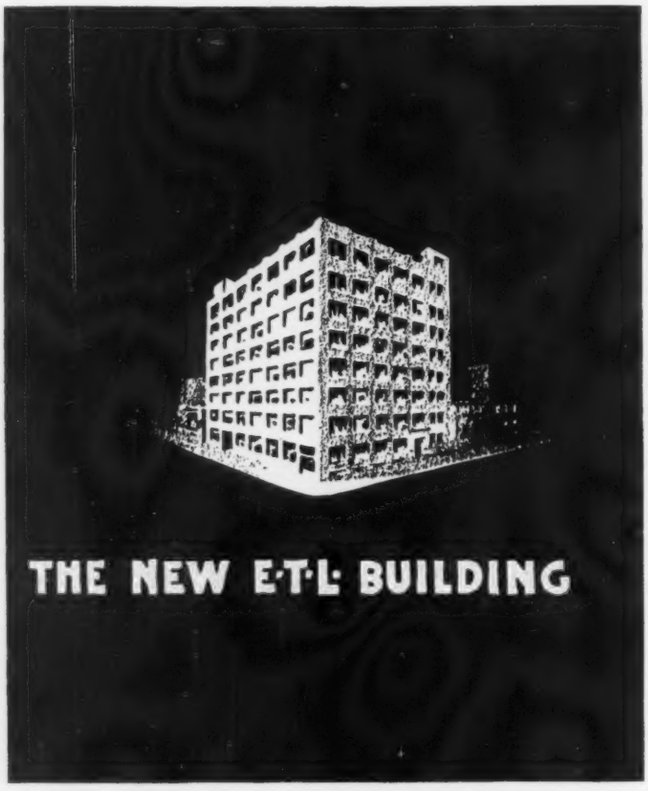
Look at the Allis-Chalmers equipment on these pages! It's engineered to give you lower service costs . . . reduced maintenance costs . . . savings in your operators' time. And that's where extra profits really start!

But you don't stop there! For when you specify Allis-Chalmers, there's 90 years of engineering superiority that works for you . . . gives you modern equipment that pays for itself in the dollars it saves!

Get the whole story of why utilities are switching to Allis-Chalmers! Learn how Allis-Chalmers works with you . . . not only gives you modern, cost-cutting equipment . . . but, equally important . . . helps build your load by being one of industry's largest suppliers of electrically driven machinery. Call the nearest district office or write direct to Allis-Chalmers, Milwaukee.

1074

LOWERING CORE AND COILS into place prior to testing an Allis-Chalmers Power Transformer in the High Voltage Laboratory. Inert Gas Protection . . . Uni-Directional Breather . . . Improved Tap Changer . . . give Allis-Chalmers Power Transformers dependable . . . maintenance-free service. Write today for Bulletin 1182.




*Testing has grown. Is growing.*

● **E.T.L. has experienced several eras of growing pains—first 5000 sq. ft.—in five years 7000 sq. ft. added—in three more years a total of 33,000 sq. ft. seemed more than adequate—then 7000 more—again a 7500 addition—then 7500 more—then 10,000.**

**Today, however 70,000 sq. ft. are provided for present use—with 36,000 sq. ft. more to grow up to—in the new E.T.L. Building at East End Avenue at 79th Street. Here, new facilities are in line with modern needs—here, comfortable expansion is provided for as business grows—here, with new equipment added to new facilities, better and faster service is possible—assured through 42 years experience and a staff whose length of service averages more than 11 years.**

**A booklet, summarizing the various services in the new E.T.L. Building, some of which may bear directly on your business, will be mailed upon request.**

**ELECTRICAL TESTING LABORATORIES**

**EAST END AVENUE at 79th STREET**

**NEW YORK**

**612:**

SMALL-PLANT and industrial a-c switchboards, with knife switches and fuses, are described in a new leaflet issued by Westinghouse Electric & Mfg. Co. The switchboards are 240 and 480-volt, three-wire, 60-cycle, three phase, ungrounded. This line of small-capacity panels is adaptable to small generating plants, lighting service, industrial and mining applications, where low cost is of prime importance. Write for this 8-page publication, No. 612.

**613:**

"OKOLITE" is the subject of a booklet published by the Okonite Co., covering Okolite insulation. Data on the application and advantages of Okolite insulated cables for high voltage circuits, comparative curves of the operating efficiency, greater load-carrying ability and moisture-resistance is included. If you would like more information on Okolite, write for No. 613.

**614:**

THE JEFFERSON ELECTRIC CO. describes their new line of fluorescent lamp auxiliaries in a new bulletin, which contains wiring diagrams, dimensional sketches and electrical specifications. For a more complete description, write for No. 614.

**615:**

A PARTIAL LIST of users of water wheel generators manufactured by Allis-Chalmers Mfg. Co. has been published in attractive catalog form. It gives a substantial list of generators built by the company for all manner of ratings from 31 Kva. to 65,000 Kva. Profusely illustrated throughout with installation views, this list is yours by marking No. 615.

**616:**

BOTH ROUND and rectangular types of switchboard instruments in sizes larger than 4" are featured in a 16-page catalog issued by Roller-Smith Co. Swinging brackets, multipliers, shunts and other accessories are also included. An index with drawings and dimensions will give you the information you'll want to know about the various types of meters, for both direct and alternating current. Write for No. 616.

**617:**

SIMPLICITY is the keynote of the Murray Panelboxes, according to the latest catalog of the Metropolitan Device Corp. Describing Murray Modern Methods, this publication is devoted to a detailed photographic analysis of these panelboxes. It aims to make clear every question regarding Murray construction that might arise. Clip out the coupon and check No. 617.

**618:**

ONE of the most comprehensive booklets ever to be published by the Westinghouse Electric Co. is their new edition on steam turbines and their application. It covers the seven principal types of turbines in sizes up to 10,000 kw., presenting charts and diagrams that assist in the economical use of steam and production of power. Large pictorial illustrations, together with cross-sectional views, show typical installations in representative industrial plants. Write for No. 618.

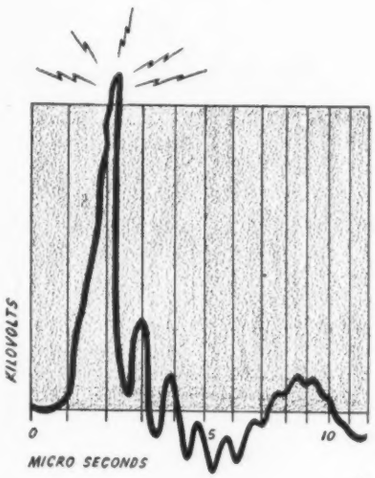
**Directory**

"1939 National Housewares Directory," published by the Associated Pot & Kettle Club, 417 Market St., San Francisco, $1.15. This is a catalog valuable to buyers of small appliances and housewares. Classified by trade names, manufacturers and products, as well as an advertisers' index, the directory gives cross-references which facilitate the finding of representation.

# BELIEVE ME! By HARDGUY PETE

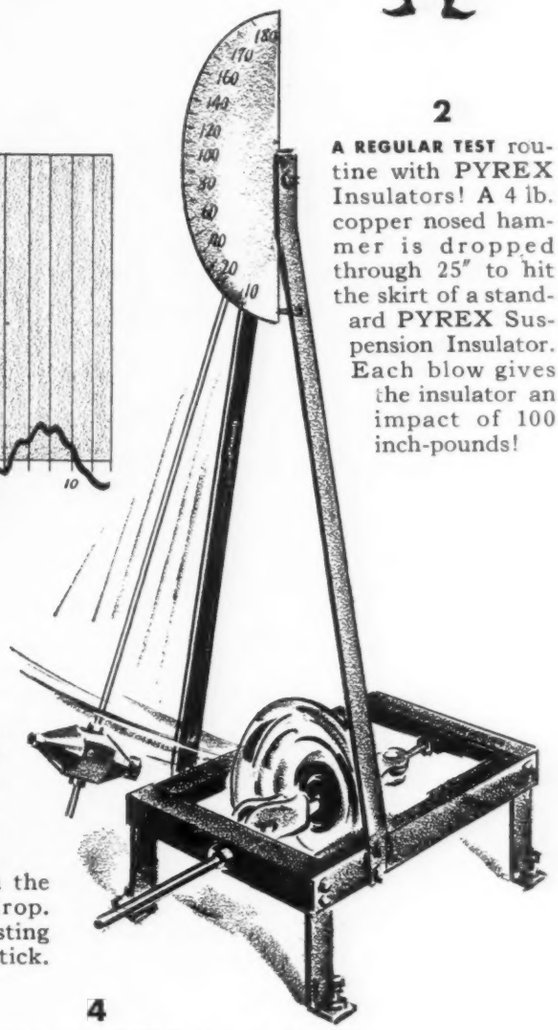
**1**

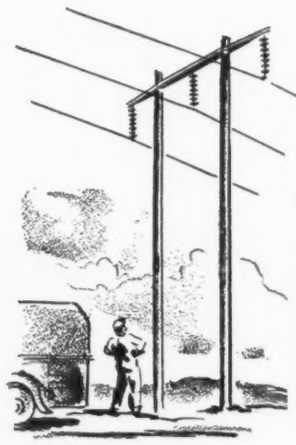
**1000 FLASHOVERS** without a puncture! In electrical surge tests PYREX units were subjected to 1000 flashovers at a voltage twice that of the ordinary 60 cycle crest flashover. This voltage was obtained with the steepest front surge available. Yet not one PYREX unit was punctured!




**2**

**A REGULAR TEST** routine with PYREX Insulators! A 4 lb. copper nosed hammer is dropped through 25″ to hit the skirt of a standard PYREX Suspension Insulator. Each blow gives the insulator an impact of 100 inch-pounds!



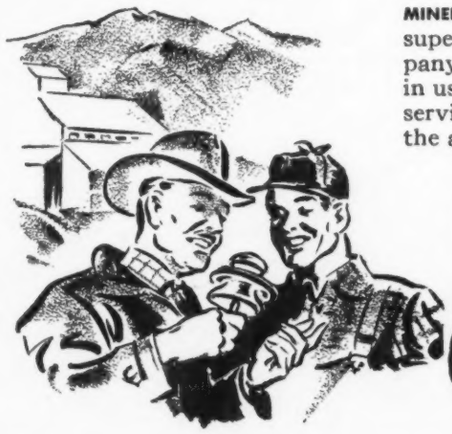



**3**

**PATROL COSTS DROP** with PYREX Insulators! If the skirt's there you know at a glance the insulator's okay. With PYREX Insulators, if a crack should develop in the head, the skirt will drop. There's no time lost testing insulators with a buzz stick.

**4**

**MINERS "STRIKE GOLD"** in PYREX Insulators! The superintendent of an Alaskan gold mining company writes: "Our Pyrex Pin Type Insulators (some in use for eight years) have been giving such good service that changes have been unnecessary; hence, the absence of orders!"



**INVITATION TO POWER MEN!**

It's open house at Corning anytime you're nearby! Drop in and see how we make glass—and why PYREX brand glass makes better insulators!

# PYREX INSULATORS

*"PYREX" is a registered trade-mark and indicates manufacture by*

**CORNING GLASS WORKS, CORNING, N.Y.**

*Visit the Glass Center at the New York World's Fair.*

# You are invited to join the industry-wide

# PROGRAM OF ACTION

THROUGH the Northwest Electric Light and Power Association, the electrical industry of the Northwest is presenting a united front to the problems confronting us all.

THE ACCOMPLISHMENTS of this united front are impressive. Within the industry the Association has fostered the adoption and development of dozens of important practices. In the field of the electrical industry's relations with the public, the Association has contributed much.

PROMINENT in the Association's activities are four Northwest conferences. These are sponsored by the (1) Business Development Section; (2) Engineering & Operation Section; (3) Accounting and Business Practice Section; (4) Commercial Cooking and Heating Section. In this issue of ELECTRICAL WEST you will find many examples of the achievements of the first two conferences.

THE PROGRAM of action carried on by the Northwest Electric Light and Power Association is vital to every member of the industry in the territory we serve—Washington, Oregon, Utah, Montana, Idaho and British Columbia. We invite you to join with us in this program.

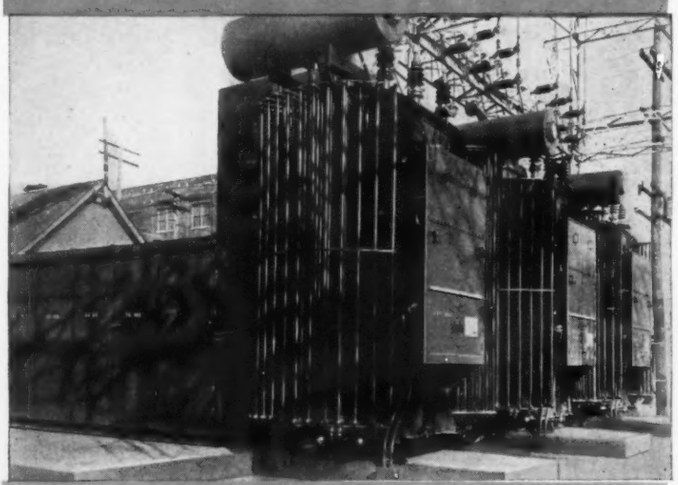
**NORTHWEST ELECTRIC LIGHT and POWER ASSOCIATION**

**707 Spalding Building** **Portland, Oregon**

# See how these large unit substations go into service

**1. They arrive—each in two major parts**

**2. They're set on solid foundations, equipped with accessories, connected . . .**



**3. And here they are—at work**

YES, even the big ones—like these three 6000/8000-kva units for the Indianapolis Power and Light Company—offer advantages in installation. Compared with conventional substations, these factory-built units have far fewer parts requiring field assembly. Consequently, they can be installed in less time and with less work.

Yet ease of installation is but one of several important reasons for specifying unit substations. And any *one* reason might justify their selection.

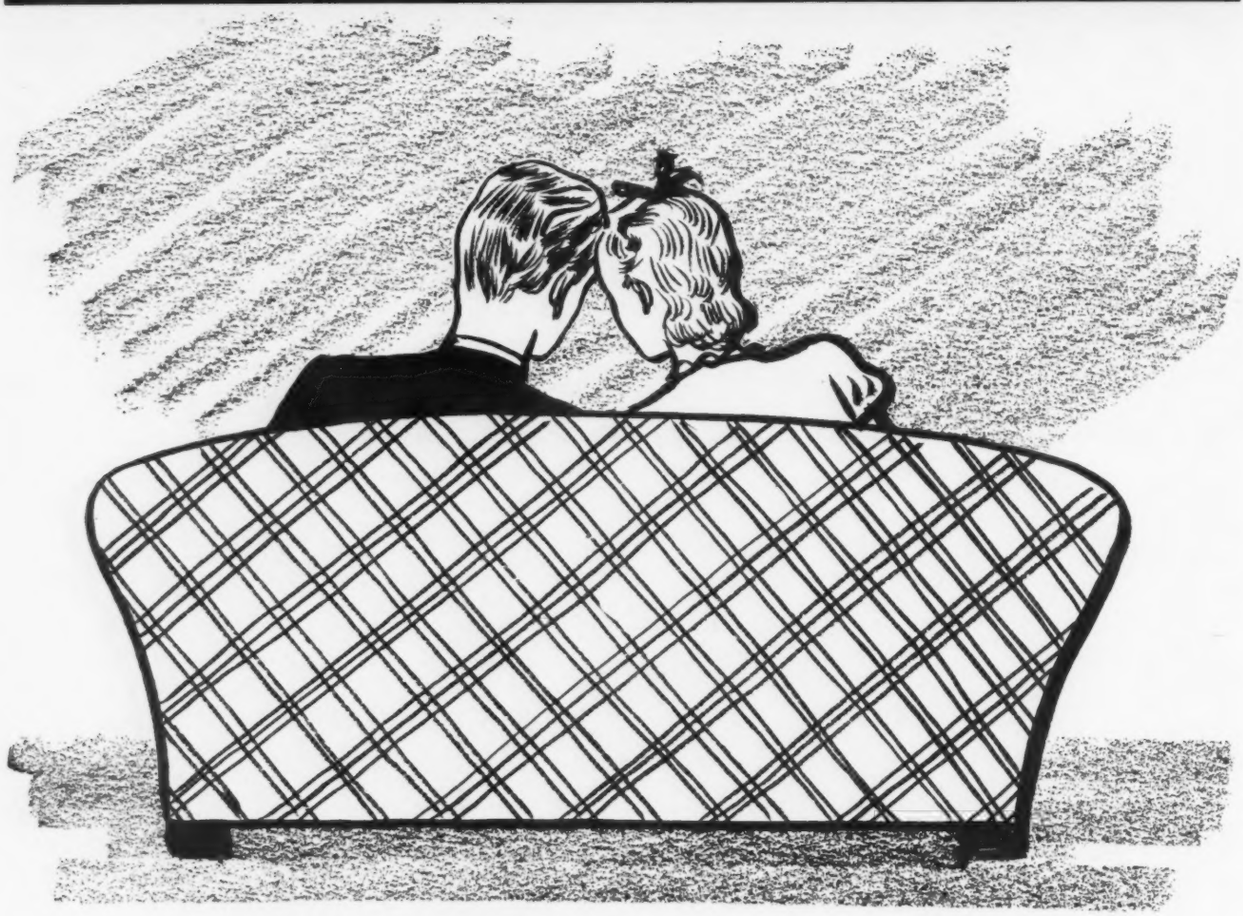
Besides installation savings, these units offer an important advantage in case the load center changes—they can be moved readily to a new location. Because of their compactness, they require less space, which means savings in real estate, too.

Furthermore, they are neat in appearance—in fact, one power company recently used pictures of actual installations to convince property owners that a proposed installation would be an asset to the neighborhood.

All in all, the unit-substation way is the *modern* way. For that next area to be served, try a G-E unit substation and experience the satisfaction that dozens of users are enjoying. For further information, call the nearest G-E sales office or write General Electric Company, Schenectady, New York.

**GENERAL ELECTRIC**

310-35



# *Two Heads*

# ARE BETTER THAN ONE

YOU have a business deal you want to close. So far, you haven't gotten to first base. At a Pacific Coast Electrical Association meeting you hear a talk that gives you a new selling slant. You try it on your prospect. It works! You walk out with the signed contract in your pocket.

P.C.E.A. helps you in this way at a big yearly convention, and at regional conclaves, and district meetings. At these events you put your feet under the same table with folks in your line and those in other branches of the industry. You exchange selling ideas with the former. The latter help you to preserve a broad viewpoint on your own business.

Membership in P.C.E.A. also gives you twelve issues of "Electrical West," packed with practical ideas and latest electrical news.

Co-operation is a requirement in today's complex business world. P.C.E.A. unites the entire electrical industry. Its value to you is many times the membership fee.

Join today!

## PACIFIC COAST ELECTRICAL ASSOCIATION, Inc.

447 SUTTER ST., SAN FRANCISCO 601 W. FIFTH ST., LOS ANGELES

PRINT IN BINDING

# YOUR NEXT MOVE - *SAN DIEGO*

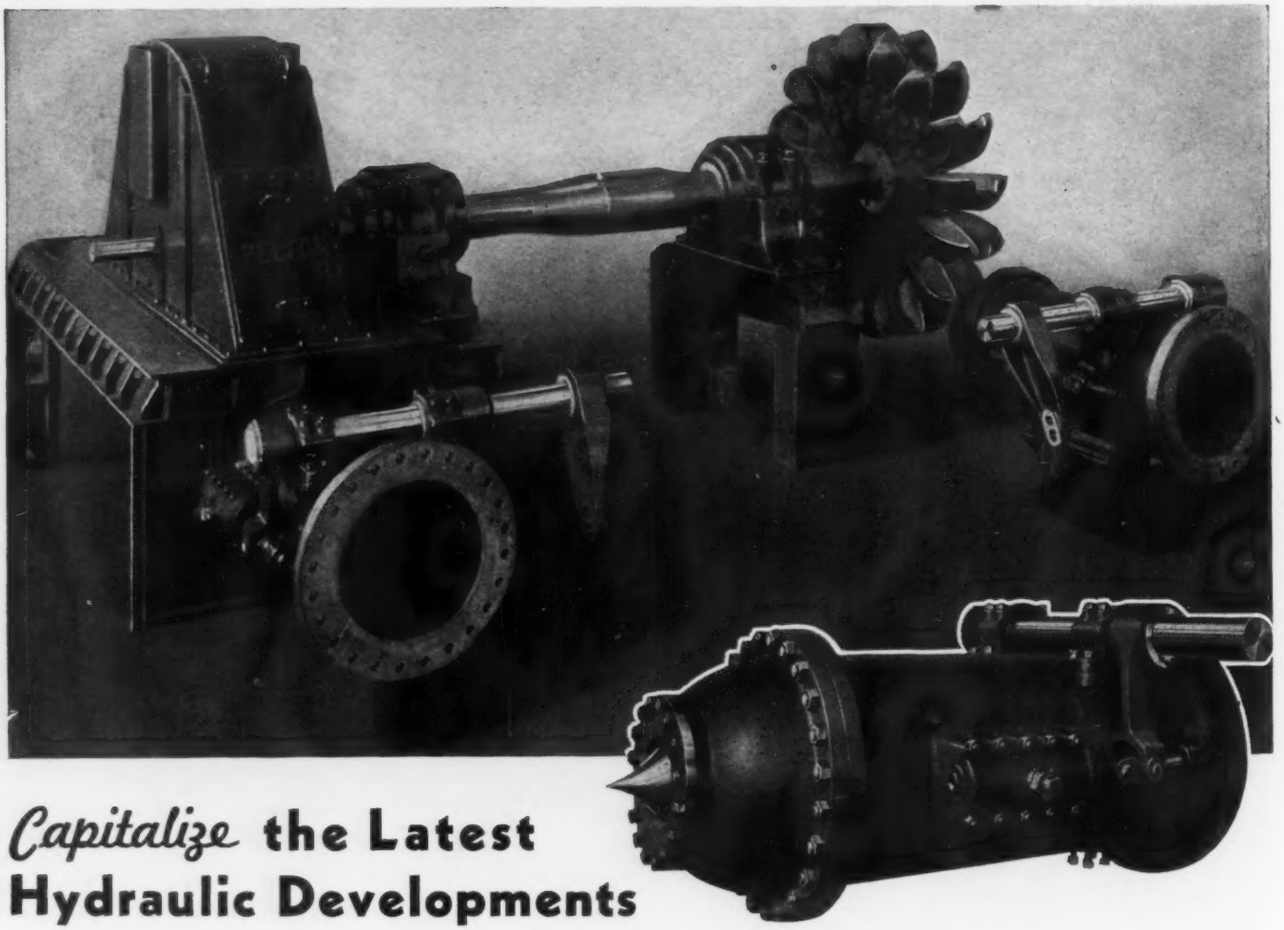
Uniformity of climate, convenient shipping accommodations, close proximity to an immediate market and an adequate power and fuel supply are essential factors in planning any business move.

San Diego, California, offers all this and more to the successful operation of both industrial and commercial enterprise. Here working conditions are at their best and conducive to most agreeable employee relations.

It is our obligation to assure an ample and dependable supply of electric power and natural gas.
Our electric generating capacity is beyond present needs and supplemented through inter-connection with two additional power sources.
Our Natural Gas lines tap California's major producing fields.
Consequently we feel safe in bidding for additional business.
Why not write the Industrial Development Department of the San Diego Chamber of Commerce and ask for more detailed information regarding the prospects for your particular business in San Diego.

**. F. RABER, President • SAN DIEGO CONSOLIDATED GAS & ELECTRIC COMPAN**

# *Rehabilitate* the Older Hydro Plants and Regain Initial Output with Less Water



## *Capitalize* the Latest Hydraulic Developments

The fact that power demands are steadily creeping closer to installed generator capacity, coupled with the possibility of a "dry cycle" and its attendant water shortage, places more emphasis upon the value of hydro-plant rehabilitation . . . that maximum output from existing developments may be realized.

Within the past few years, notable improvement has been made in water wheel design, particularly in nozzles and buckets. Replacement of these parts at relatively small cost assures a substantial increase in efficiency and definite improvement in operating characteristics. Ask Pelton engineers for particulars.

**THE PELTON WATER WHEEL COMPANY**
HYDRAULIC ENGINEERS

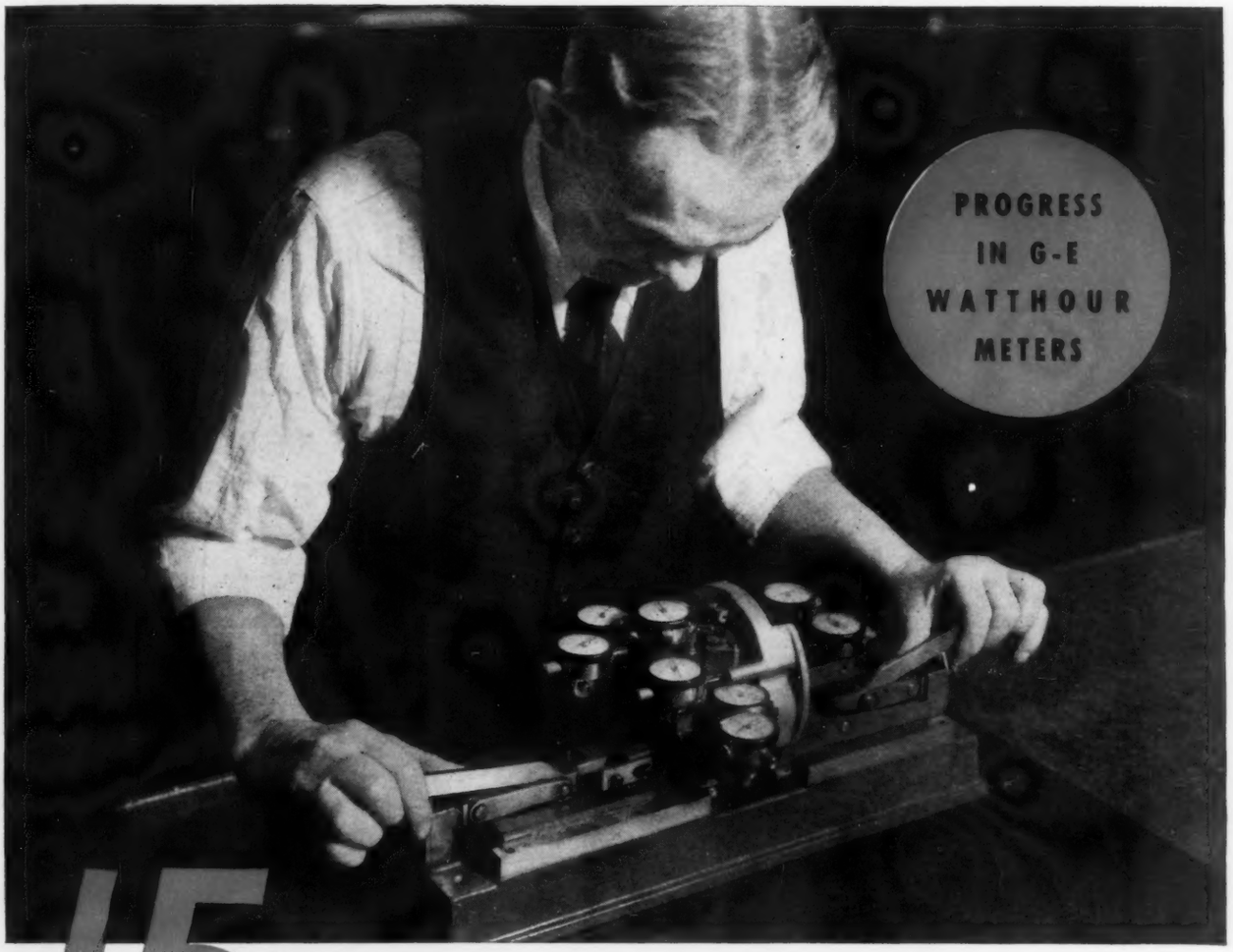
**120 Broadway**
**New York**

**2929 Nineteenth Street**
**San Francisco**

**Paschall Station**
**Philadelphia**

**EXCLUSIVE WESTERN REPRESENTATIVES for Baldwin-Southwark Corp., De La Vergne Engine Co., Cramp Brass & Iron Foundries Co., Woodward Governor Co., Cone Valve Division, Chapman Valve Mfg. Co. and Carbondale Division, Worthington Pump and Machinery Corp.**

**PELTON**




# 15 DIMENSIONS GAUGED IN ONE OPERATION

**Precision analyzer enables inspector to measure 15 dimensions of meter-frame casting and to determine their relationships with a high degree of accuracy**

YOU will recall that the foundation of an I-30 watthour meter is formed by the main frame, a high-grade casting. The machining of this casting requires extreme precision in order to maintain accuracy of product and to make sure that each meter has the same wide-limit characteristics.

With this multiaction gauge, developed by G-E engineers, the inspector can determine whether the castings come within the exceedingly close tolerances necessary. In a single, simple operation he can do the work faster and more accurately than by the older, tedious hand method. In this way it is possible to machine frames by the thousand and still maintain an accurate check of all the dimensions.

This is but one of the many details that contribute to G-E meter progress. Milestones—such as the Types I, I-14, I-16, I-20, and I-30 meters—represent the major steps forward, but such detailed progress as is illustrated by this precision analyzer is continuous. Taken all together, they result in improvements in quality—and thus in performance—and often in economies to industry. General Electric Company, Schenectady, N. Y.

### *An Invitation*

*Would you like to visit our plant at West Lynn, Mass.? We extend a cordial invitation. It's an interesting trip; we think you will find it most profitable. Take a day or more if you can; but if you've only an hour, come just the same. Make arrangements through the nearest G-E sales office.*

**1889 1939**

*Fifty Years of Meter Progress*

**GENERAL ELECTRIC**

400-37

**HEADQUARTERS FOR ELECTRICAL MEASUREMENT**

# IN ONE *Self Contained* INSTRUMENT

**10**
**D. C. VOLTAGE RANGES**
sensitivity 20,000 ohms per volt—1.5 to 1500 volts

**10**
**A. C. VOLTAGE RANGES**
sensitivity 1,000 ohms per volt—1.5 to 1500 volts

**12**
**D. C. CURRENT RANGES**
readings from 1 microampere to 15 amperes

**10**
**DECIBEL RANGES**
measurements from −18 DB to +58 DB

Among other WESTON multi-range instruments are the Model 665 Volt-Ohm-Milliammeter... Model 763 Ohmmeter with resistance spread 1 ohm to 300 megohms (6 ranges)... Model 663 Volt-Ohmmeter... and Model 764 Capacity Meter covering measurements from .00005 to 100 microfarads.

Here's an instrument that quickly pays for itself in any plant... because of the wide variety of jobs it will do. When not busy on trouble-shooting, it can be used for the inspection of purchased parts... for check-ups on plant equipment... for standardization studies or research work. It fits the assembly line, too; especially where runs are short, and circuits subject to change. And many other test requirements are fully met by this flexible, multi-range instrument... keeping it active... *earning*... throughout every working day. » » » Complete information on this Model 765 and other *equally flexible* WESTON multi-range instruments is available in bulletin form. Write to Weston Electrical Instrument Corporation, 577 Frelinghuysen Avenue, Newark, New Jersey.

# WESTON
## *Instruments*

**WESTERN REPRESENTATIVES**

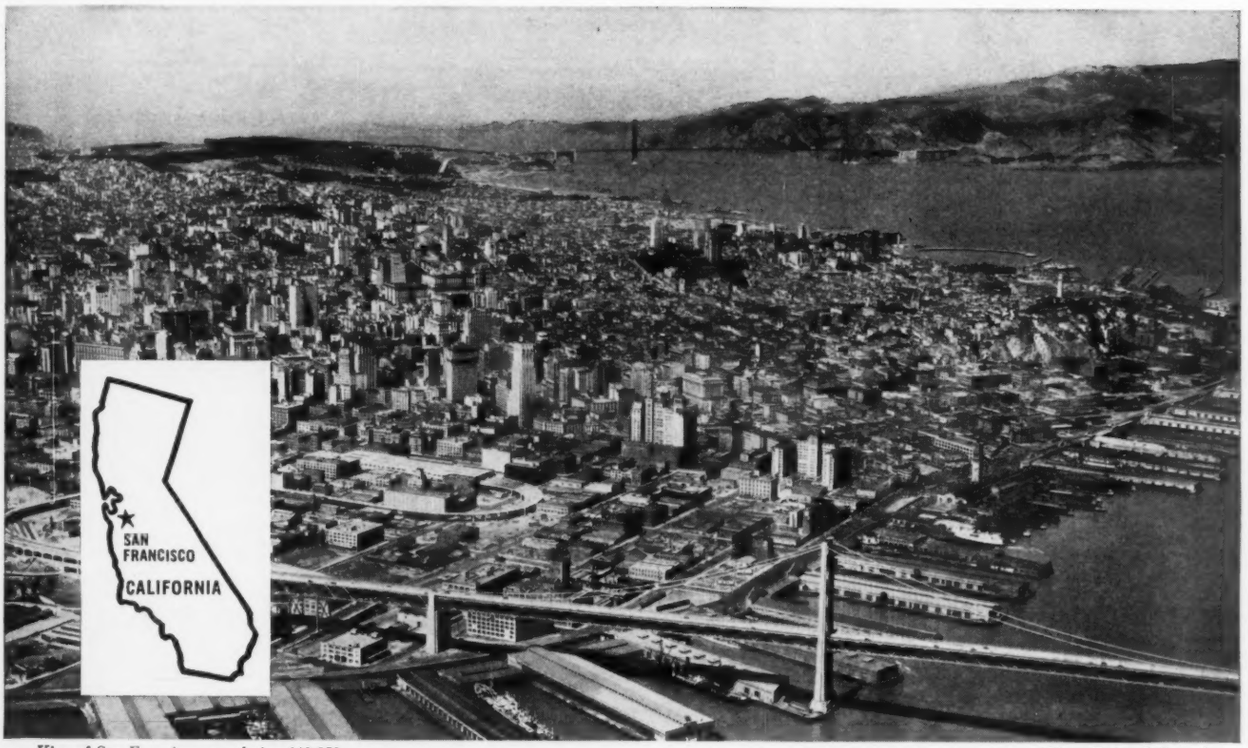
Seattle, Wash.
Eicher & Bratt,
263 Colman Bldg.

San Francisco, Calif.
Herman E. Held,
420 Market St.

Los Angeles, Calif.
A. A. Barbera,
Subway Terminal Bldg.

Denver, Colo.
J. W. Van De Grift,
623 Charles Bldg.

Phoenix, Ariz.
J. E. Redmond Co.,
448 W. Madison St.




*View of San Francisco, population 642,250* (*Photo-Ewing Galloway*)

# Selling lamps and lighting in SAN FRANCISCO, CAL.

## (*and cities of similar size*)

**IN YOUR CITY.** You can easily estimate the approximate number of lamp and lighting advertisements General Electric is delivering to your customers by applying the following national averages:

***Going into the average wired home in 1939***

14 magazines with G-E lamp ads
5 newspapers with G-E lamp ads
5 radio messages

24 total advertising messages

• • •

***In the last 10 years, the average wired home received***

158 magazines with G-E lamp ads
30 newspapers with G-E lamp ads
20 radio messages

208 total advertising messages

HERE'S a rapid view of the way that General Electric advertising is constantly at work in San Francisco, promoting light-conditioning for Better Light-Better Sight. Into San Francisco homes every week goes a steady stream of G-E lamp and lighting advertisements amounting to 45 impressions per person in the last ten years.

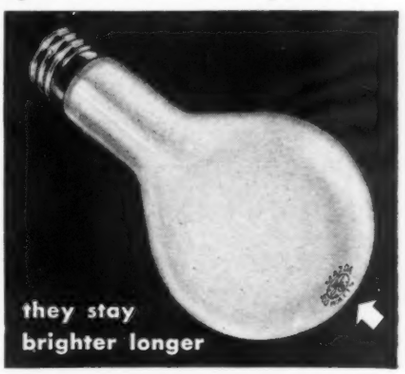
**IN 1939 . . .** 2,160,000 magazines with G-E lamp advertisements and 700,000 radio messages.

**SINCE 1929 . . .** 22,788,000 magazines with G-E lamp advertisements.

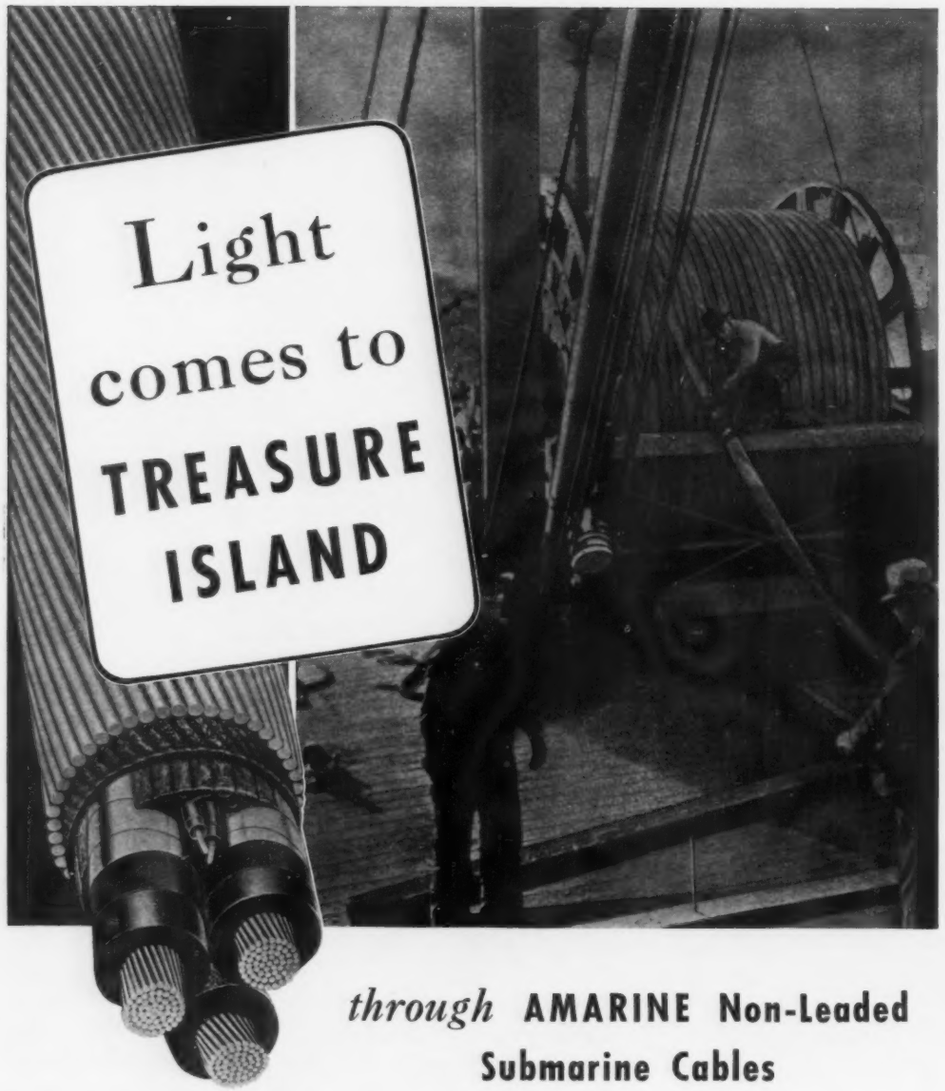
**FALL 1938 . . .** 1,353,000 copies of newspapers with G-E lamp advertisements.

**LAST 3 YEARS . . .** 3,845,000 newspapers with G-E lamp advertisements.

**SINCE 1929 . . .** 29,433,000 advertisements in magazines, newspapers, and radio. Which is approximately 45 advertisements per capita.




**GENERAL ELECTRIC**
**MAZDA LAMPS**



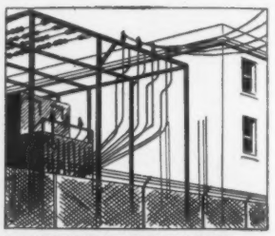

## *through* AMARINE Non-Leaded Submarine Cables

NEW heights in the art of illumination have been attained at the Golden Gate International Exposition. First to be perceived by the visitor, and perhaps last to be forgotten, are the novel lighting effects. These are dependent upon electrical energy—energy carried to the Island by *Amarine* non-leaded submarine cables, laid beneath the waters of San Francisco bay.

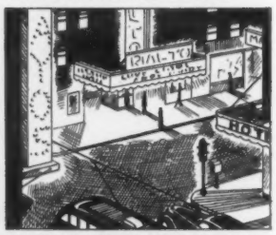
Each cable is composed of three stranded copper conductors, insulated with Amarine-40 rubber compound for service at 11,000 volts. Armored with heavily galvanized steel wires, it has an outer diameter of more than 4 inches and weighs 18 pounds per foot. Each conductor of the shore end is shielded with tinned copper tape. A thin layer of semi-conducting material, applied between rubber insulation and copper tape and in intimate contact with both, assures positive and permanent shielding.

The new cables, installed in 1938, lie not far from two other Amarine non-leaded submarine cables that were installed in the same bay 16 years ago, and which are still in good condition and giving satisfactory service.

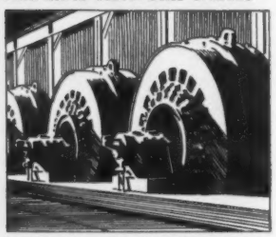
ADEQUATE WIRING SERVES AND SAVES



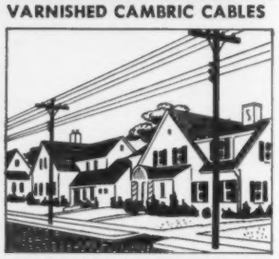
PAPER INSULATED CABLES



AMARINE NETWORK CABLES



VARNISHED CAMBRIC CABLES



RELIANCE WEATHERPROOF WIRES

AMERBESTOS CABLES

PARKWAY CABLES

COLUMBIA STEEL COMPANY, *San Francisco, Pacific Coast Distributors of Electrical Cords & Cables*

*Manufactured by*

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York*

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

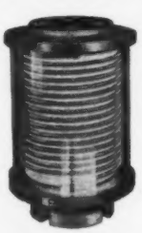
# "TO SAVE SPACE *and Considerable* EXPENSE WE INSTALLED S&C FUSES and *Resistors*"

*Below:* Typical substation (37KV) installation of S&C Current-Limiting Resistors and Fused Disconnects.

● The power company engineer, quoted above, selected S & C Fused Disconnects with Resistors because of low initial cost and maintenance expense. Protection was required for station service transformers where severe short circuits could develop . . . By mounting Resistors on the same insulators as the Fuses, a compact installation resulted. By applying Resistors, the magnetic stresses on the system are greatly reduced.

S & C Liquid Fuses used the world over, from Burbank to Bombay, have given years of proof of reliability. They *maintain* accuracy of time-current characteristics, do not deteriorate, and like the Resistors are self-contained. Enclosed in Pyrex glass, their condition is always easy to inspect without removing the fuse or resistor. By simply looking at the fuse you can tell whether or not it is blown.

**S & C RESISTORS**



**S&C RESISTORS**—available for use on 7500 to 138,000 volt systems, outdoor service;—2300 to 34,500 volts, indoor service.

## SCHWEITZER & CONRAD, INC.

**4435 Ravenswood Ave., Chicago, Ill.**

*Manufactured in Canada by Powerlite Devices Ltd., Toronto, Ont.*

WESTERN REPRESENTATIVES

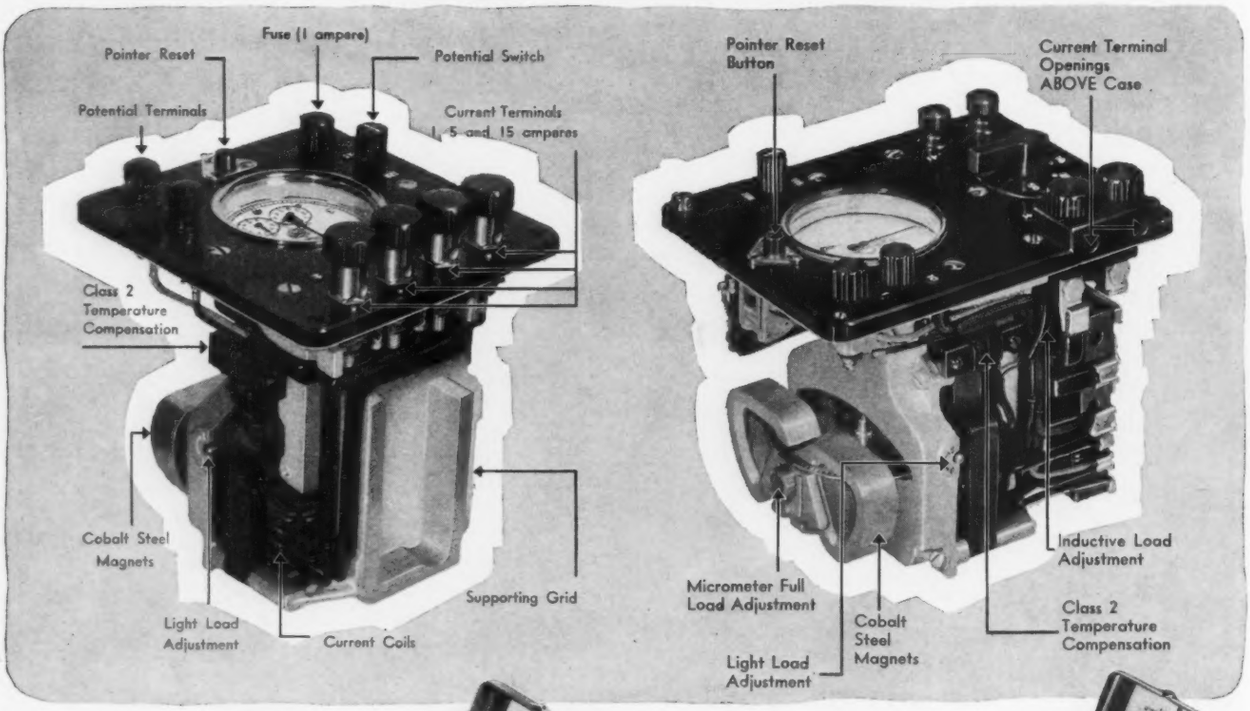
SAN FRANCISCO
George E. Honn
420 Market Street

SEATTLE
T. S. Wood
220 Ninth Avenue, North

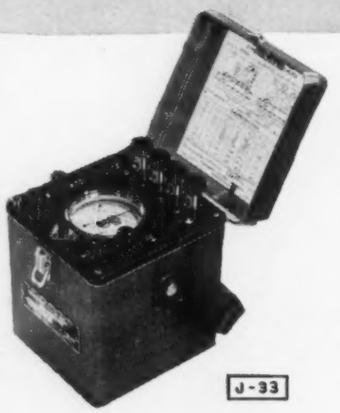
LOS ANGELES
Farnham & Cunningham
Edison Bldg.

SALT LAKE CITY
Riter Engineering Co.
Kearns Bldg.

# OPEN FOR INSPECTION




Especially adapted to the accurate and efficient testing of watthour meters of the capacities usually employed in residential service, Type J-33 is designed with separate terminals for each of its three (1, 5, and 15 amps.) current coils.



J-33

The selector switches of Types J-5 and J-3 meters facilitate switching to any desired current coil. 1, 5, 10, 25, and 50 amperes in Type J-5; 1, 5, and 25 amperes in Type J-3. Silver contacts are used on both current and potential switches.

J-5 J-3

## SANGAMO PORTABLE TEST METERS

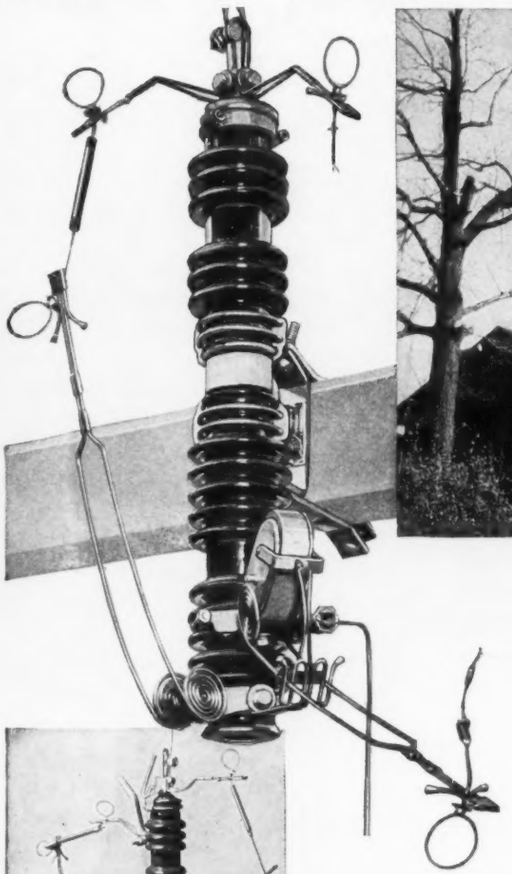
All three types of Sangamo Portable Test Meters, the J-33, the J-5, and the J-3, invite your critical inspection. Test them for accuracy! Test them for current-carrying capacity! Study their compact construction!

The minimum size, the light weight, the efficient design—all increase the convenience and speed of watthour meter testing. The average handling portable test meters may be obliged to stand will not affect the performance of Sangamo Test Meters.

Use your own test-rack to prove the straight-line accuracy and ample current-carrying capacity of these modern meters.

**SANGAMO ELECTRIC COMPANY** SPRINGFIELD ILLINOIS

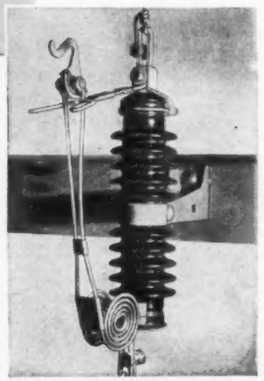
# PROVE TO YOURSELF — HOW TO GET BETTER SERVICE



*This triple-link, with one fuse cartridge blown, shows definitely that a fault has been cleared—service quickly restored—equipment protected—a patrol saved.*

**COMBINATION TRIP-O-GAP AND TRIP-O-LINK SWITCH**

*Now—before severe lightning damages expensive equipment—install inexpensive Trip-O-Gap Trip-O-Links right on transformer to positively ground discharges. Ratings—5 and 7.5/12.5 KV, 50 amperes.*



**TRIP-O-DISCONNECTS —** *The ideal, inexpensive disconnect for signal, high line telephone circuits rural lines—lines for ratings—5, 7.5/12.5 and 15 KV, 75 amperes.*

## *with these* KEARNEY TRIP-O-LINKS

GIVE the same sort of efficient service to your rural customers as you do to those in urban districts — by installing genuine, inexpensive Kearney Trip-O-Links, Trip-O-Link Trip-O-Gap and Trip-O-Disconnect Switches . . . Each of these switches is revolutionary in design — simple in construction — the result of careful engineering research that has solved your problem of providing efficient protection to your equipment in rural districts where operating budgets are low.

Over a period of years, many operating men have discovered the money-saving advantages of these switches . . . You can learn the advantages, too. Place a trial order . . . Try these switches . . . If they don't meet your approval and satisfaction — send them back . . . We'll refund your money if you say these switches aren't O K — and then some.

Take advantage of this profitable offer — Ask a Kearney representative to show you this popular line of switches or

*write for prices and descriptions*

**ASK FOR LATEST BULLETIN SHEET NOT INCLUDED IN BULLETIN 312**

*Exclusive Sales Representatives*

**MAYDWELL & HARTZELL**

INCORPORATED

LOS ANGELES • SAN FRANCISCO • PORTLAND

*EXCLUSIVE DISTRIBUTORS*

GRAYBAR ELECTRIC CO. Seattle, Portland, Tacoma, Spokane • WESTINGHOUSE ELECTRIC SUPPLY CO. Phoenix • J. R. BRADLEY CO. Reno

VARNISHED CAMBRIC . RUBBER COVERED POWER CABLES . BUILDING WIRE

CRESFLEX NON-METALLIC SHEATHED CABLE . SERVICE ENTRANCE CABLE . FLEXIBLE CORDS . RADIO WIRES

BARE WIRE . SIGNAL CABLE . MAGNET WIRE . LEAD-ENCASED AND PARKWAY CABLES . ARMORED CABLES

# CRESCENT
## INSULATED WIRE and CABLE

## *COAL MINES Use It!*

Where safety of human life and limb as well as uninterrupted production depend on a constant flow of current for power and light, you'll find Crescent Wire and Cable among the chosen few.

Imperial Cable, shown at the right, is an all-rubber portable cable which combines every feature of toughness, durability and safety required in the severe duty encountered in and around mines. Also, you can count on it to fill, with entire satisfaction, the most difficult portable cable installations.

ADEQUATE WIRING SERVES AND SAVES

CRESCENT
INSULATED WIRE & CABLE CO. INC.
TRENTON, NEW JERSEY

WESTERN REPRESENTATIVES

LOS ANGELES
Henger-Seltzer Co.
130 S. Hewitt St.

SAN FRANCISCO
Hodges & Glomb
1264 Folsom St.

KANSAS CITY
W. F. Howe & Co.
2627 McGee St.

CRESCENT ENDURITE SUPER-AGING INSULATION . WEATHER-PROOF WIRE

# CHROMALOX

## makes another top score
### *with*
## THE NEW 3-RING RANGE UNIT FOR 5-HEAT OPERATION

Note how this new 2000-watt unit distributes its various heats over the full surface of its cooking area. See how it gives a "Medium" heat approximately ¾ of full heat. Observe how it brings out the exclusive Chromalox feature of "two-units-in-one", the economy feature that always boosts sales for Chromalox-equipped ranges.

What better combination of units could you find on a range top, than one of these new Chromalox 3-ring, 2000-watt units, and two or three of the 2-ring Chromalox units for 5-heat operation? Housewives *know* these units, with their speedy, flat-top contact cooking, their "two-units-in-one" economy, their easy cleaning. And dealers, utilities, range manufacturers all know their amazing record of satisfied users.

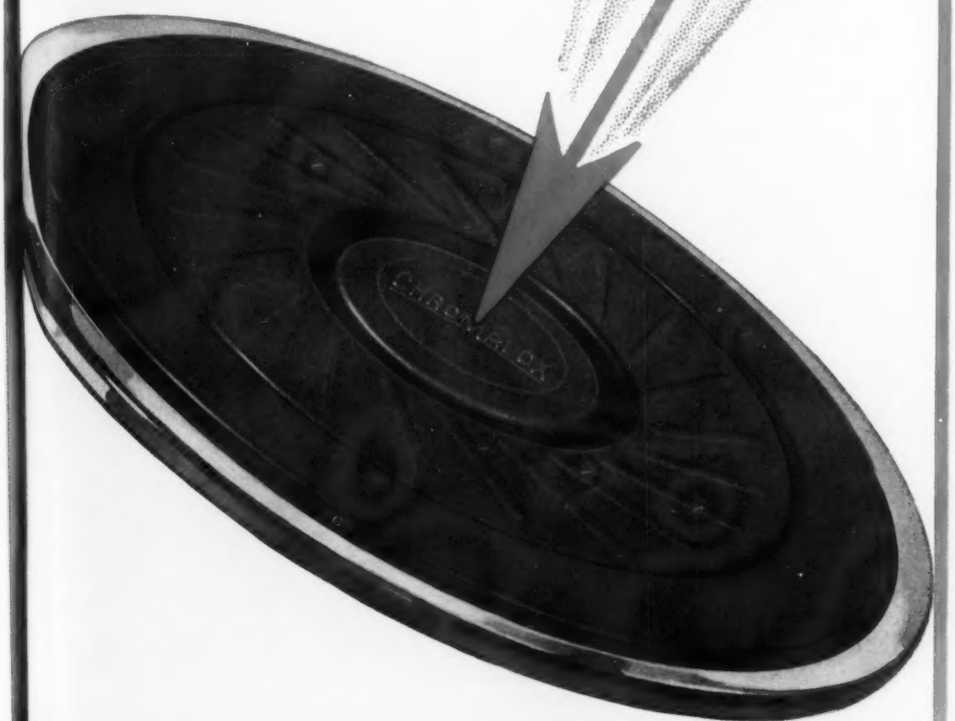
Let Chromalox Super-Speed range units and Chromalox-equipped electric ranges help *you* score a new high in sales.

**EDWIN L. WIEGAND CO., 7540 Thomas Blvd., Pittsburgh, Pa.**

*Write us or our nearest representative*

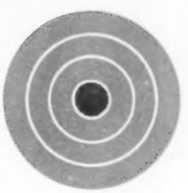
MONTGOMERY BROTHERS

911 Western Ave., Seattle, Wash. · 1501 N. W. Kearny St., Portland, Ore.
61 Fremont St., San Francisco, Cal. · 420 So. San Pedro St., Los Angeles, Cal.
THE PETERSON COMPANY · 1921 Blake Street, Denver, Colo.



## FIVE HEATS and TWO COOKING AREAS in one unit

**HIGH** — *all three rings energized. (Note red color is used to illustrate operation — but Chromalox units do not glow red in service. They are designed to transmit heat by conduction* — contact).



**MEDIUM** — *two rings only energized, giving approximately ¾ of High heat distributed as illustrated.*

**CENTER** — *middle ring only energized, permitting the use of small utensils with maximum efficiency and economy — the exclusive Chromalox "two-units-in-one" feature.*

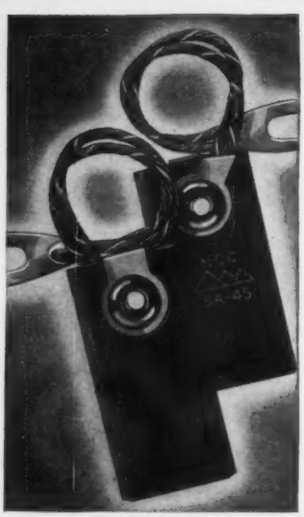
**LOW** — *reduced wattage over two rings only, giving approximately 1/6 of High heat.*

**SIMMER** — *all three rings at low intensity, giving 1/16 of High heat.*

# NATIONAL CARBON BRUSHES
TRADE-MARK

## *give dependable performance*

## UNDER THE VARIED AND EXACTING DEMANDS OF STEEL MILL SERVICE



*This mill drive equipment, in a new hot strip mill in the South, is an example of the type of heavy duty service on which "National" Carbon Brushes have proved their ability to give reliable and economical service.*

*Let our experienced representatives show you how to improve brush performance with "National" Carbon Brushes.*

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation UCC Carbon Sales Division: Cleveland, Ohio

General Offices: 30 East 42nd Street, New York, N. Y. Branch Sales Offices: New York - Pittsburgh - Chicago - San Francisco

IT MUST BE RIGHT

# smooth sailing with TRIANGLE

TRIANGLE PRODUCTS GO PLACES

TRIANGLE PRODUCTS REWARD BUYERS!

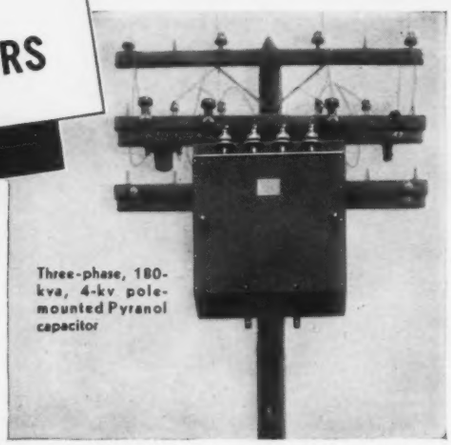
TRIANGLE CONDUIT & CABLE COMPANY, INC.

Horace Harding and Queens Blvds.
Elmhurst, New York City, N. Y.

Pacific Coast Division: C. C. Hillis, Vice-President in Charge of Sales, 390 Seventh St., San Francisco, California

# *They Got Feeder Capacity for $7 per kw Instead of $21.50*

## HOW A MISSOURI UTILITY PROFITED BY USING DISTRIBUTION CAPACITORS



Three-phase, 180-kva, 4-kv pole-mounted Pyranol capacitor

FOUR years ago the Union Electric Company of St. Louis needed a substantial increase in capacity on one of its feeders to meet the anticipated winter peak loads of 1935-36.

One way to obtain this capacity was to install a new feeder—capacity 1500 kw—costing $21.50 per kw. Instead, the power company engineers worked out a method of increasing the load-handling ability of their overhead distribution circuits by applying shunt capacitors arranged for pole mounting. This method of approach enabled the company to get the capacity it required at much lower cost than that of building a new circuit. They installed two 180-kva pole-type equipments and released 500 kw of capacity at a cost of $7 per kw by improving power-factor on the existing circuits.

Inasmuch as 500 kw of capacity was calculated to be adequate for all requirements during the near future, the larger investment in the new feeder would have been largely for excess capacity—another factor favoring the use of capacitors. This company has found this method of increasing system capacity so satisfactory that today it has installed over 16,000 kva in this type of equipment.

### The Service Record of G-E Pyranol Capacitors

Today, after G-E Pyranol capacitors have been in service nearly four years, the Union Electric Company reports the following experience with these units:

1. After capacitors were installed, the peak loads handled by the feeder were 25 per cent greater than could otherwise have been handled successfully.

2. The installation immediately reduced voltage drop on the feeder from 7.8 volts maximum to 4.6 volts maximum, allowing a margin for increased load.

3. The capacitors have operated continuously, without requiring maintenance of any kind.

4. Because one year's carrying charges on the forestalled investment in a new feeder were sufficient to pay the total installed cost of the capacitors, the capacitors can be said to have paid for themselves each year since they were installed. Savings in line losses have bettered even this performance.

### Savings for You

Overloaded substations and feeders on your system offer opportunities to release capacity at a saving with G-E Pyranol capacitors. You will find that improved voltage conditions and reduced losses are extra benefits that usually follow the installation of capacitors. Ask your G-E representative for complete information or write for GEA-2746, "Pyranol Capacitors for Central Station Applications." Address General Electric Company, Schenectady, New York.

### COMPARING THE COSTS

| New Feeder | | Distribution Capacitors | |
|---|---|---|---|
| Circuit | $10,800 | Capacitor cost (installed) | $3500 |
| Feeder position | 13,500 | | |
| Allocation of Duct Space | 8,000 | | |
| Total | $32,300 | | |
| Capacity obtained | 1500 kw | Capacity released | 500 kw |
| Investment per kw | $21.50 | Investment per kw | $7 |

Note that the carrying charges on the out-of-pocket investment for a new feeder, $24,300 (i. e., $32,300—$8,000) at 15 per cent, would have been $364 per year, or more than the cost of the capacitors completely installed.

**GENERAL ELECTRIC**

360-147

# ...IT COSTS MONEY TO REPLACE RUSTED GUYS

**There's a simple, economical answer to your rust problem—use NON-RUSTING Copperweld guy strand for all your guys. » » The thick ductile layer of pure copper permanently molten welded to the tough steel core of Copperweld is ENDURING protection against rust . . . enduring because copper metal is not dissolved by usual atmospheres. » » Copperweld guy strand is doubly guaranteed; first, a guarantee of copper thickness on every wire; second, a guarantee that the finished strand will have the rust-resisting life of solid copper.**

A new eight page data booklet recently published contains information on physical properties of Copperweld strand, also installation suggestions and a convenient graphical method of determining the required strength of guys. If you haven't received a copy, write for Engineering Data Booklet E. D. 1686.

**COPPERWELD STEEL COMPANY** · *Glassport, Pa.*

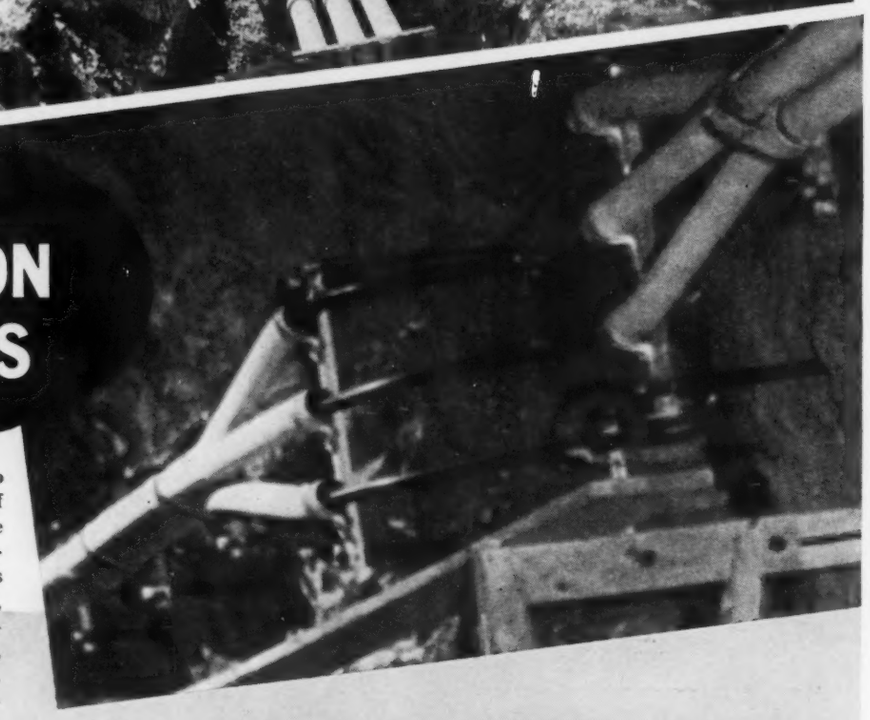
*Pacific Coast Representative:* **C. E. INGALLS, Rialto Building, San Francisco, California**

# YOU'RE MONEY AHEAD

## CUT INSTALLATION COSTS

You don't pay for concrete when you install J-M Transite Conduit. Strong and durable, it needs no protective casing underground. But when "concreting-in" is specified, its thinner walled, lower priced companion, Transite Korduct, saves on handling and material costs. Both Conduit and Korduct are light in weight, rapidly laid under any conditions.

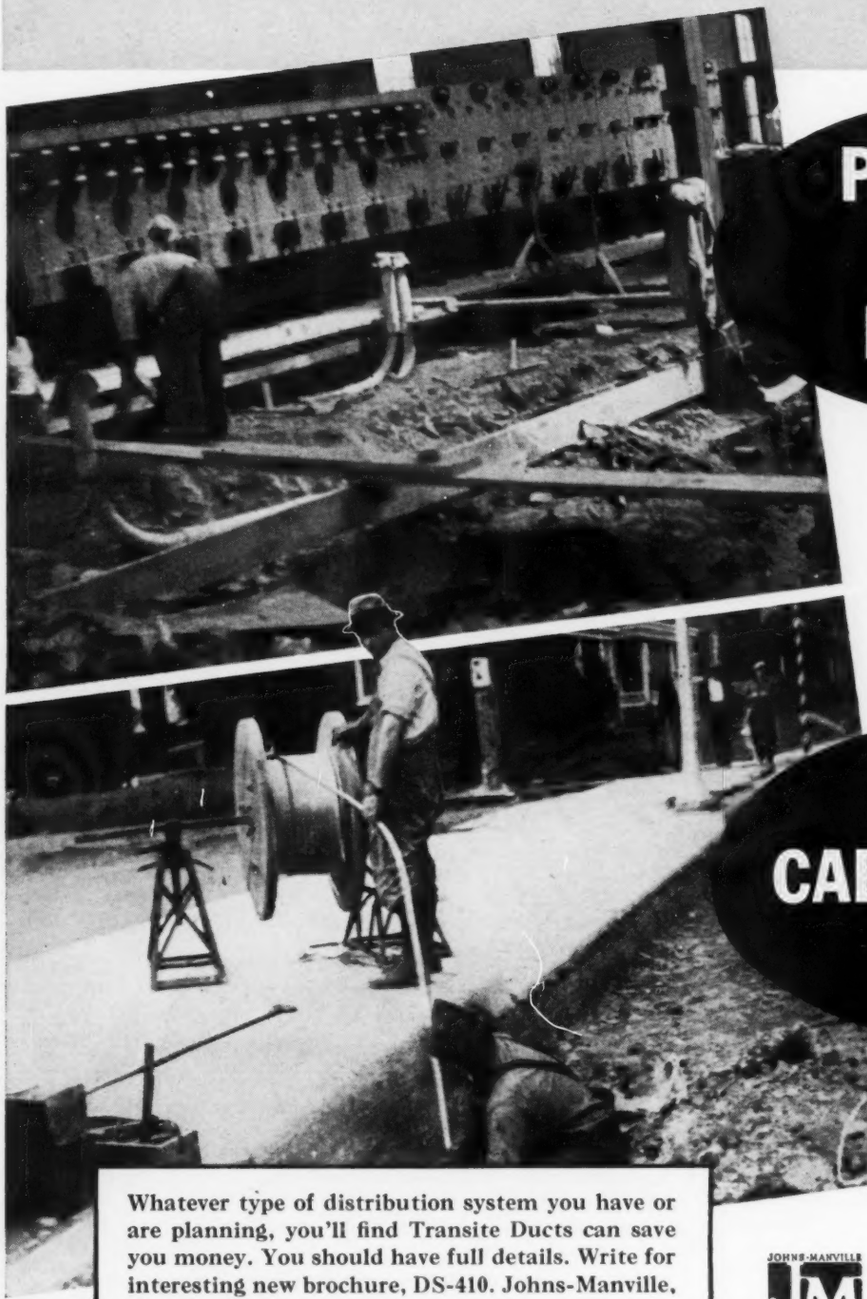
## END CORROSION TROUBLES



There's no distribution service too tough for Transite Ducts. Made of asbestos and cement, they take the severe punishment of acid and alkaline soils, corrosive fumes and gases with little or no maintenance. And, because J-M Transite Ducts are entirely inorganic and non-metallic, they cannot rust, rot or decay . . . are completely immune to electrolytic action.

**Johns-Manville**

# WITH DUCTS THAT—



## PREVENT FIRE LOSSES

The asbestos-cement composition of Transite Ducts gives positive protection against fire. Their unusual resistance to flame and arc prevents damage to adjacent cables and equipment when burnouts occur in the line. And Transite Ducts will not cause or contribute to the generation of fumes and combustible gases.

## MAKE CABLE PULLS EASY

Transite Ducts are made with a smooth bore that *stays* smooth in service. Joints are snug and tight... free from obstructions and jagged projections. Long cable pulls can be made quickly without damage to sheathings. Cables are easily removed and replaced at any time, even after years of hard service.

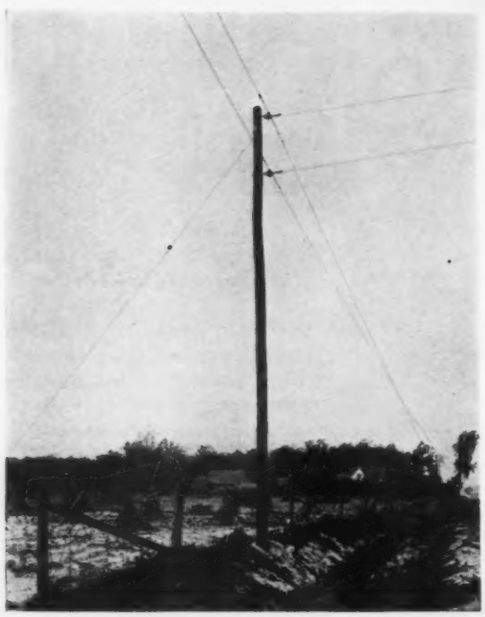
Whatever type of distribution system you have or are planning, you'll find Transite Ducts can save you money. You should have full details. Write for interesting new brochure, DS-410. Johns-Manville, 22 East 40th Street, New York, N. Y.

JOHNS-MANVILLE JM PRODUCTS

# TRANSITE DUCTS

**For Low-Cost Electrical Distribution**

# "They're takin' down conductors that were too small to carry the load"



"We're sure savin' money with this engine-driven rig; it reels up the old conductors as it pulls in the new. Too bad, though, we couldn't have saved the expense of a change-over by makin' the line heavy enough in the first place."

Of course, you can't always anticipate growth of loads. But give your rural load builders a chance to profit by their efforts. Use conductors of sufficient conductivity to take care of at least a reasonable increase in demand.

A.C.S.R. provides the necessary conductivity. It has enduring strength which makes first costs low and holds down maintenance costs. ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh, Pennsylvania.

**A·C·S·R**

*Aluminum Cable Steel Reinforced*

FOR RURAL LINES AND POWER TRANSMISSION

# LAPP

## INSULATOR CO., INC., LEROY, N.Y.

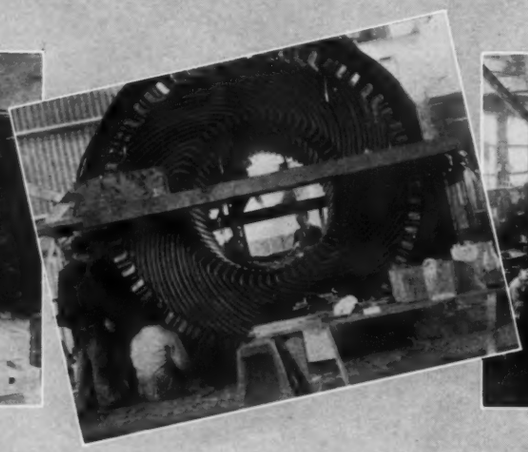
**THE BARGAIN IN SUBSTATIONS IS STATION POST CONSTRUCTION . . . BETTER PERFORMANCE . . . SAME COST**

. . . You've got a bargain when you get more for your money than you might normally expect. You can do this by getting same value for less money, or by getting greater value for same money. Wise management is finding that in station building it gets more value for the same money by insulating switches and buses on Lapp Station Posts. By offering more attractive business-like appearance, greater resistance to arcover, superior handling of dirt conditions, elimination of puncture and cracking, greater rigidity and higher impact strength, the Station Post offers a generous plus in improved service and reduced maintenance costs. You can get your favorite switching equipment on Station Posts at the same price as on old-fashioned conventional type insulators.

# Westinghouse

The Westinghouse Exhibit at the Golden Gate International Exposition. Thirty people are employed to man the exhibit. →

← The Westinghouse Building in Los Angeles—complete facilities for serving Southern California and the adjacent territory.



The three pictures above, from left to right, show service shops at Los Angeles, Emeryville, and Seattle—each fully equipped to handle promptly all kinds of electrical repair work, as well as marine turbine service jobs.

At left, new Emeryville office building, equipped with first commercial "reverse cycle" air conditioning system installed in San Francisco Bay area. At right, a few samples of insulators made in Emeryville porcelain plant — the largest plant west of the Mississippi manufacturing a complete line of porcelain insulators.

W WESTINGHOUSE ELECTRIC **Westinghouse**

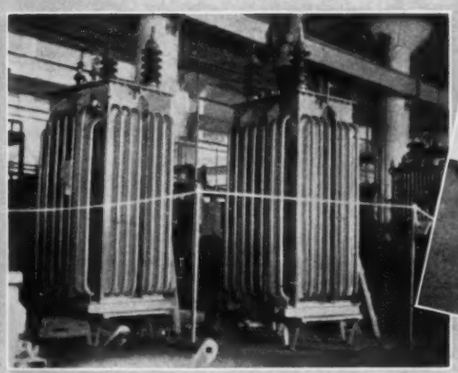
# SERVES THE WEST!

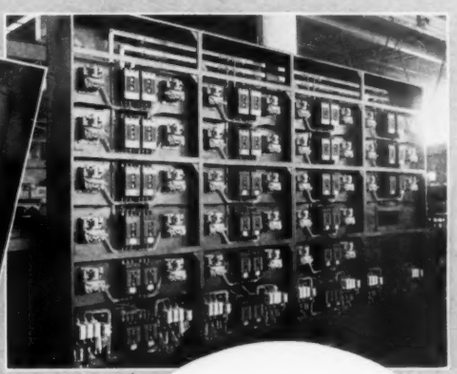
No one to whom you can look for all 'round electrical assistance is more truly Western than Westinghouse! With manufacturing plants, warehouses, offices, distribution facilities, and complete service and repair shops, Westinghouse offers you every facility for doing business with a Western organization.

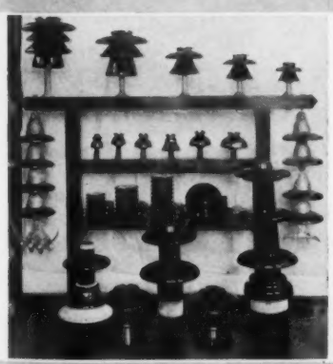
Our Western pay roll includes 1,210 people, with an average annual salary expenditure of approximately $2,500,000. We have major offices in 9 cities, and branch offices in 5 others. Westinghouse agent-jobbers, handling apparatus as well as merchandise, are located in 11 cities. And hundreds of Western dealers, from border line to border line, profit from a substantial business in Westinghouse home electrical products.

These Westinghouse Western people are at your service — for any electrical requirement! Address the nearest Western office.

J-93172

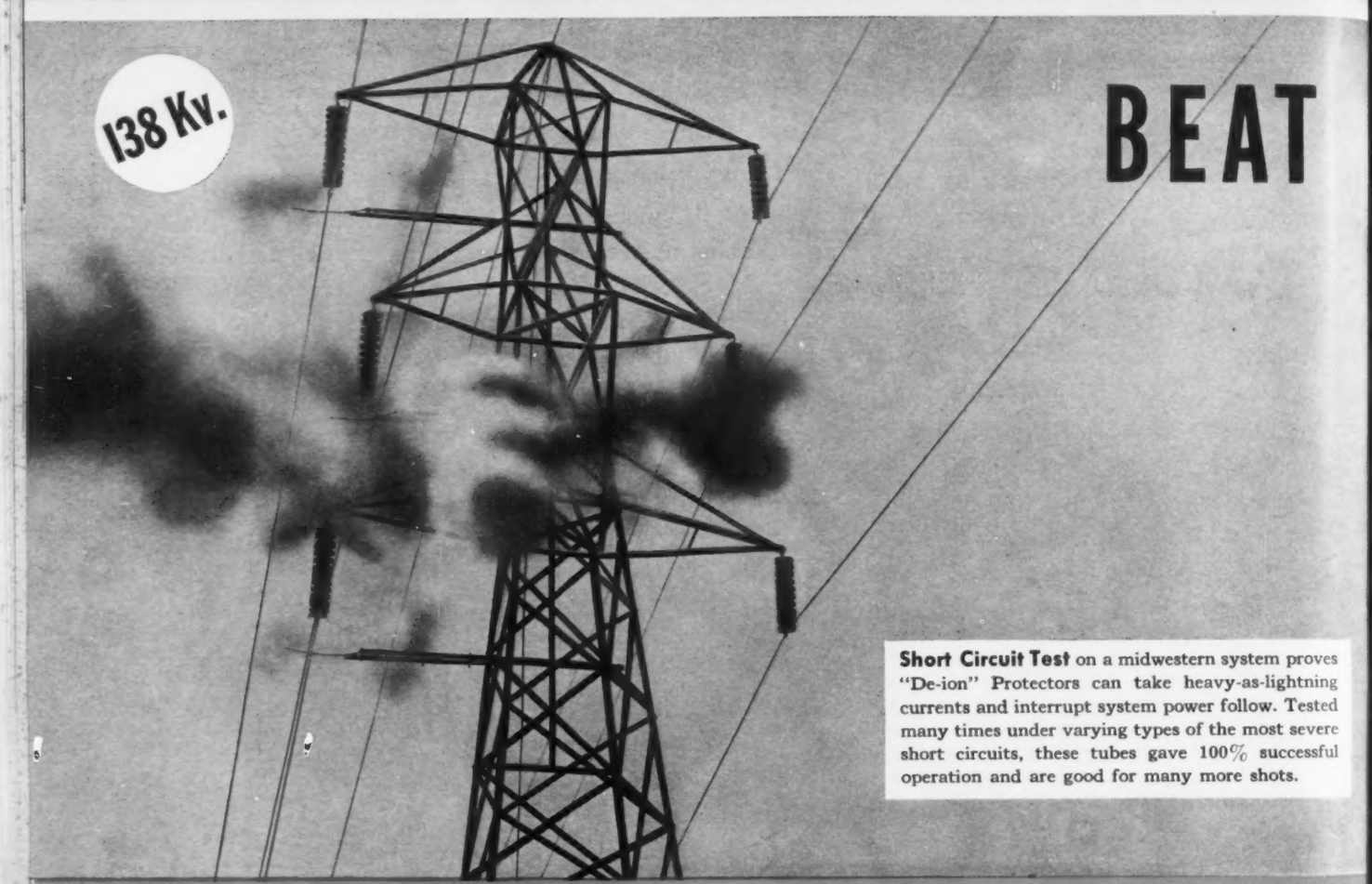






Above are shown some of the products of the Emeryville manufacturing plant, where motors, transformers, electric water heaters, switchboards and panelboards are produced.

# Electrical Equipment



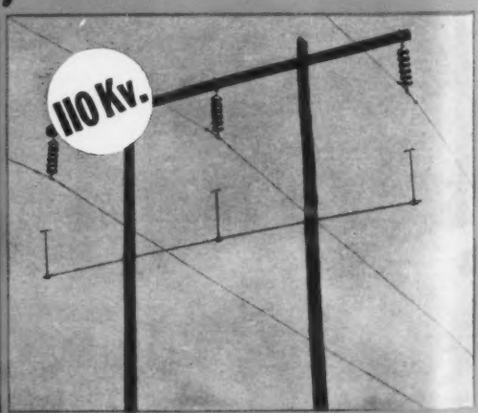

# BEAT

**Short Circuit Test** on a midwestern system proves "De-ion" Protectors can take heavy-as-lightning currents and interrupt system power follow. Tested many times under varying types of the most severe short circuits, these tubes gave 100% successful operation and are good for many more shots.

## EASY TO INSTALL ON *Any* LINE...

**Prior to "De-ion" Protectors,** outages on this 54-mile line averaged 46 a year . . . today after the installation of Protectors, less than 4 a year.

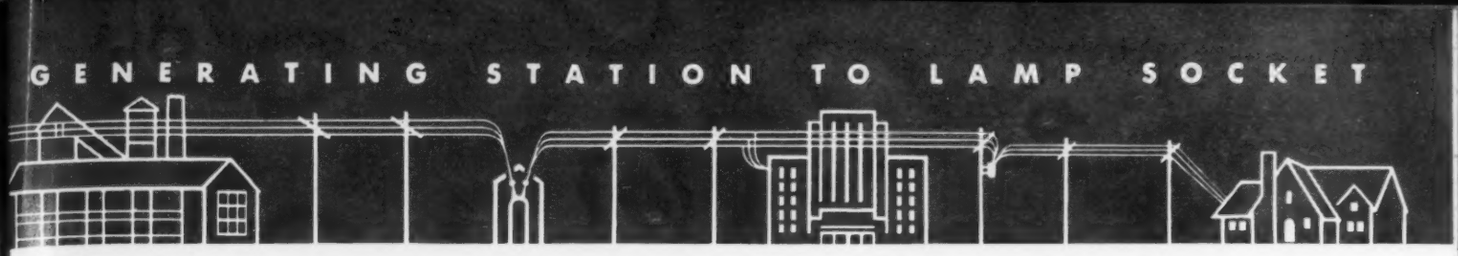
**These Pole-Top Switches** no longer are damaged by lightning. "De-ion" Protectors have stopped flashovers.




**Shattered insulators** can no longer be caused by lightning on this line since "De-ion" Protectors have been installed.

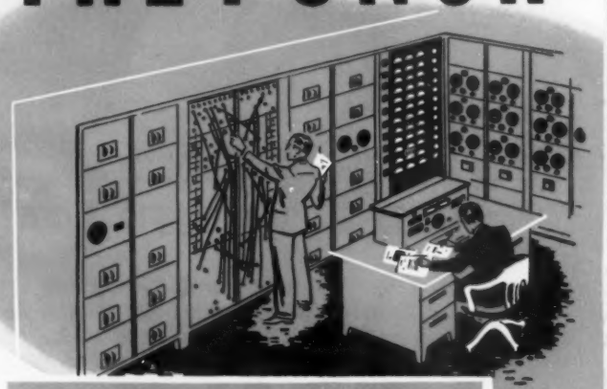
W
WESTINGHOUSE ELECTRIC

# Westinghouse




# *Lightning* TO THE PUNCH

• • • **ELIMINATE TRANSMISSION LINE OUTAGES WITH "DE-ION" PROTECTORS LOCATED WITH RELATION TO OVER-ALL SYSTEM PROTECTION**



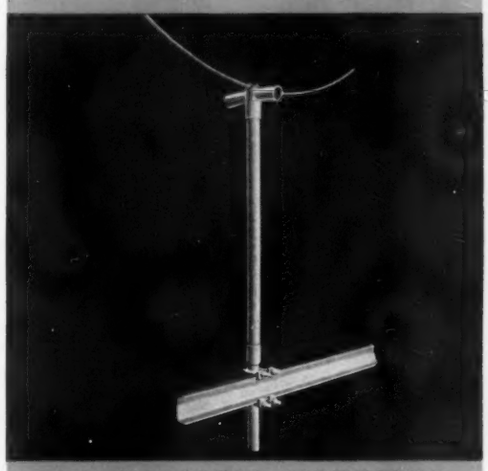
*Where* lightning will strike transmission lines can't be predicted. But exactly what will happen on your system *can* be.

By using the A-C Network Calculator, Westinghouse engineers have determined exactly how to assure properly RELATED PROTECTION for any system . . . from generating station to lamp socket. On this "miniature system," all types of transmission lines have been duplicated faithfully. Correct protection at any point has been worked out . . . and proved.

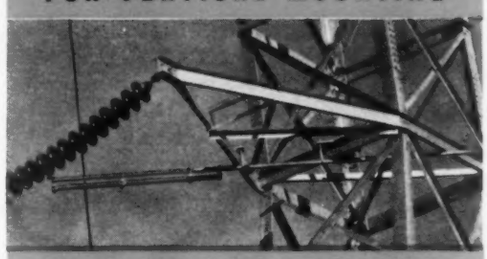
Particularly on the A-C Calculator have studies been made of system recovery voltages for varying system conditions. To this has been added extensive laboratory tests on "De-ion" Protector performance. The result is that Westinghouse engineers have proved knowledge of how to apply "De-ion" Protectors to assure that the resulting transmission line protection is as nearly lightning-proof as possible. With such protection you can obtain benefits such as increased dependability that allows loading the system with a greater degree of confidence . . . and the prevention of 60-cycle shorts that would open substation breakers.

Why not take advantage of Westinghouse engineering knowledge to "Beat Lightning to the Punch?"

**"DE-ION" PROTECTORS**



**FOR VERTICAL MOUNTING**



**FOR HORIZONTAL MOUNTING**

J-60304

# Related Protection

# FREE

# LOAD SURVEY WHEN YOU BUY C·S·P

## C·S·P DISTRIBUTION TRANSFORMER MAKES ITS OWN LOAD SURVEY

It's much simpler to see whether or not a light is burning than to take complicated readings with instruments. And that's the way C·S·P makes its own load survey — without cost.

When the signal light comes on, you know that safe loading has been exceeded and it's time to do something about it. Best of all, this automatic, cost-free load survey is continuous — working for you 365 days a year.

In addition C·S·P's give you these other money-saving features —

### 1. Savings up to $7.50 on every installation

C·S·P's cost less to install simply because there is less equipment to install. One self-contained package instead of separate transformer, arresters, fuse cutouts and fuses.

### 2. Fuse outages 100% less

Because there are no fuses in C·S·P, there can be no fuse outages. Best available records show that fuse outages average from 5% to 10% for conventional transformers.

### 3. Maintenance cost greatly reduced

Compare the cost of replacing damaged arresters, fuses, cutouts or an entire transformer with the simple reclosing of the C·S·P breaker. That's why C·S·P's cost less to keep in service.

### 4. A service record that speaks for itself

C·S·P's are reliably performing all the functions for which they were designed. These include:

Complete self-protection against lightning.
Complete self-protection against burnouts from overloads.
Complete self-protection against burnouts from short circuits.
Complete self-protection against service interruptions from fuse outages.

Compare this record with your own knowledge of the performance of conventional transformers.

**FOR MORE INFORMATION**

Facts like these are important to you. They have a direct bearing on your company's balance sheet. Get the whole story. Call or write your nearest Westinghouse office.

J-70191

*Proof*

**838 Power Companies, large and small, are using C·S·P's today. They are finding that every C·S·P is a money-saving investment. Their experience is the source of evidence presented here — proof of money saved.**

# Westinghouse Transformers

WESTINGHOUSE ELECTRIC

# ELECTRA'S HUSBAND

## *Into Hot Water*

"I'VE a good mind to buy a gas water heater," burst from Electra, apropos of some mental tribulation.

"That's sacrilege and heresy in the thirty-third degree," I protested, "Why on earth—"

"Because nobody seems to know anything about electric water heaters that makes sense to me" she answered. "I never heard of such silly regulations and nonsense. A salesman was here today to *sell* us an electric water heater. You'd think he was doing us a favor to *allow* us to use it. It made me wonder if this business of yours is in its right mind!"

Of course I didn't admit to her that I sometimes wonder myself. After all I have my self respect to maintain. But I went over to smoke a pipe with my friend the inventor — remember, the chap who solved the wiring problem in one sweep of the broom. He was in fine trim, too.

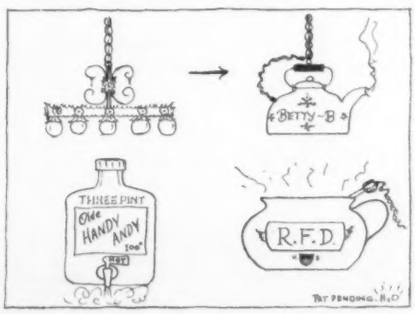
"Water heaters everywhere," he struck a pose, "and not a drop to drink!" (I had reason to doubt that, as you may too.)

"Waterheating is simple. It is one of the simplest things in our business. Even an engineer understands it. *Each* engineer, I may say, understands it. That is, *he* understands it perfectly. What he cannot understand is that every other engineer cannot understand it the way he does, it is so simple.

"It has occurred to me that what ails hot water is that it is too all-fired simple. It can be fired by *all* kinds of fuel and still be hot water. Thus the idea of applying electric heat to water in the simplest fashion possible and getting hot water as an end result is too preposterously simple. We must complicate it. It's more fun.

"A mere 600 different combinations of sizes and models is all that any manufacturer must make and stock today to meet the demands of the utilities—hardly scratching the mathematical combinations and permutations of the possibilities. When I think of the sheer creative joy that our rate departments are cheated out of by this paucity of enterprise, I weep tears (hot). When every city, every farm, yes, every person might have a water heater type of his very own, especially designed as to placement and number of heating elements, thermostats, tank sizes and/or all three! Our ultimate goal, who shall say us nay, should be *a separate and individual water heater for every customer*. Does not every customer have individual finger prints? Of course! Is he to have his life regimented in hot water? Is this America, or is it Russia?

"YOU are familiar, I take it, with the more common kinds now—such as side arm, valve in head, V-8—and the various wattages, 1500, 2000, 3000, 5000,, a thousand and two, three, four (here my friend went into a chant like that of the tobacco auctioneer ending with—) Sold to American! The various types of tank—round, square, roundish square, squarish round, Virginia Round two rounds and a rubber—as well as the covered and the Sally Rand or nudist, tanks. Then some little progress has been made recently in the matter of thermostats and heating elements. Some like a single, some a double with twin beds, with a blonde for good measure. Some like them high, some low, (thermostats, not blondes) some jump into the bramble bush and jump right out again. And there are quite a commendable variety of temperature ranges, from tepid to warmish, to hot, hotter, hotter yet, just a little hotter please, ouch!




"If you don't mind a little commercialism, and even if you do, let me describe some of *my* patents. One is to use the electric fever machine to get the water all hot and bothered inside the tank. You've seen corn popped in such an electric field over at the House of Magic at the Fair. I should warn anyone who thinks of competing with me that it will not do to use riveted tanks for such heaters. You pop the rivets. Then where are you? Wet, I'd say.

"Not long ago one of our prominent holding company executives went to England and was mightly impressed with the jolly English model of hanging tea kettles, one for every sink—or basin as they call it in Blighty. Others have come back from England full of concentric ideas—no I mean eccentric. Concentric goes with wiring, not ideas, although the two seem intermingled, you might say. But my invention is better than the conventional suspended tea kettle. It has more authentic styling. Something of old world charm is retained in my *central* suspended tea kettle, better known as the Betty for short. "Betty-be-ready." (See the diagram).

Since central lighting fixtures are decidedly passe, thanks to the hopelessly standardized I.E.S. lamps, what an opportunity to utilize the old central fixture at no extra wiring cost. Just hook on to the pair of No. 18 fixture wires, take down the fancy tin and pewter affair and install this handy hanging tea kettle. Think of it, hot water at the tilt of the teakettle. Use it for tea, coffee, cocoa, or ovaltine and drop off to sleep immediately. A special off-peak rate would induce many old maids to have these installed in their living rooms.

"ANOTHER contribution to mankind is my 3-element thermostatic hand washer water heater. A special job, called the Handy Andy, takes a three pint tank, and a thermostat to each pint. Some get tanked on much less than three pints. After exhaustive tests, load and temperature tests, graphs and charts, this unit is computed to be sufficient for a family of 3, and to stretch a point, or a pint, a family of 3.1416 or $\pi$, providing the husband is not engaged as a printer, garage mechanic, or in the utility business. People with such dirty hands call for my special model of five pints—and a surcharge.

"But my pride and joy is this R.F.D. Special, equipped with a handy detachable element, especially designed for rural territory and low buying power. But very cozy on cold winter mornings, I can assure you."

With that I escaped. I haven't the heart to tell Electra that we have the problem well in hand.

# GUARANTEED!

## FREE FROM RADIO INTERFERENCE

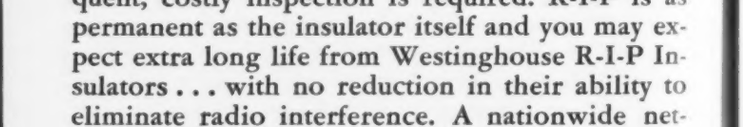
## ..at no Added Cost!

R-I-P (radio interference-proof) Porcelain is the exclusive development of Westinghouse research . . . the result of years of extensive experimentation proved in actual installations of major power companies throughout the United States.

Because of these facts . . . and because R-I-P Porcelain is rigidly inspected, Westinghouse guarantees that it will eliminate distressing corona or radio interference caused by capacity arcs at the insulator. R-I-P Porcelain is not new. It does not depend on gadgets or changes in fundamental design to free it from radio interference. An exclusive metallic glaze is part of the insulator itself.

### AS LASTING AS THE INSULATOR ITSELF

There is nothing to deteriorate on a Westinghouse R-I-P Insulator. No added cantilever, thermal or torsional stress is thrown on the insulator. There is no metal to wear, to corrode or loosen. No frequent, costly inspection is required. R-I-P is as permanent as the insulator itself and you may expect extra long life from Westinghouse R-I-P Insulators . . . with no reduction in their ability to eliminate radio interference. A nationwide network of supply depots provide overnight service. Porcelain plants in Emeryville, Cal., and Derry, Pa. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pennsylvania. J-05044



This Westinghouse porcelain plant at Emeryville, Calif., is the only porcelain plant on the West Coast. It makes all sizes of electrical porcelain for this area.

# Westinghouse Porcelain

W WESTINGHOUSE ELECTRIC

ELECTRICAL WEST

# Ours Is an Industry Latent With Opportunity for All

By A. E. HITCHNER
President, Pacific Coast Electrical Assn.

HABIT is a dangerous thing. As people we tend to become so accustomed to the luxuries and conveniences of modern life that we no longer view them as the miracles that they once were. Everything becomes accepted as a matter of course. The same thing happens with our daily work. We may become so engrossed in details or daily routine that we lose our perspective. The functions of the job become so important that opportunities may be overlooked or problems brushed aside with a casual "Mañana".

Fortunately the electrical industry is not afflicted with this dangerous habit. During its 50-year life its men and women have always been inspired by visions of a future more bright than the past. The problems of the day have been attacked and solved in order that the industry might survive with the strength to act tomorrow. It has been ever thus and we can be assured that the future will be little different, provided we keep before us the inspiration of the pioneers who launched our industry.

No matter how vexatious the problems of the moment may appear, there are opportunities ahead for all—for the utility, the manufacturer, the contractor, the wholesaler, the retailer and for the people who make up their multiple organizations. The industry's future progress and profit will depend in no small measure upon the success with which these opportunities are recognized and their potentialities developed. Some of these will entail the solution of problems which appear difficult. But when we compare them to tribulations and disappointments which marked the experiments of the early creators or to the financial struggles of the pioneers who founded the operating utilities in this region, we must confess that they are not insurmountable.

For purposes of the record I have set down some opportunities which run the entire gamut of the industry. Any of you can list others. I point to these merely to stimulate the imagination of each and every member of the industry and to prove to them that our industry is one in which the ambitious and energetic may succeed.

### Rebuilding the Electrical Highways

Opportunity number one may be listed as the breaking of the traffic jam which is preventing the fullest possible utilization of electrical service in the homes, stores, buildings and factories of this country. Like many highways, the wiring in these structures was designed for the traffic of a decade or more ago. Today its inadequacy is a stumbling block for the whole industry. Sales of equipment and appliances are dammed up, and the additional use of electric energy is precluded. Not only does the industry lose, but the customer also suffers in many ways—he pays for electricity he does not use and he must put up with inconvenience and discomfort.

To bring the wiring of existing structures up to standards commensurate with today's electrical possibilities, to say nothing of providing for the future, would mean the creation of an electrical market which can be measured in millions of dollars.

Here then is an opportunity lush with potential business for every branch of the industry. But it will not fall into our collective laps like ripe apples from a tree. There are problems of technique to be solved. And a successful sales approach must be developed which will convert the national promotional effort in this field into actual business.

### Making Friends for the Industry

In the last analysis people are interested in what affects them. Herein lies opportunity number two. As good as has been the industry's accomplishment in taking its story to the public, the job can be done more effectively, particularly in the light of the present social unrest. Outgrowth of the depression has been a resentment on the part of the public toward business in general.

In all of this the electrical industry has not been overlooked. Our already low rates have been attacked. The prices for our goods have been questioned. Cooperatives have been proposed which would by-pass the wholesaler and the retailer in an effort to bring down appliance prices.

Irrespective of what we may think, the average American does not know, or thoroughly understand what our industry has done for him. We have a job of education and interpretation to do in showing the public what our industry has done to improve products and services, to effect economies, to create jobs, to reduce the cost of living, to save time and money, and, finally, to improve the overall American standard of living. We know that electricity has contributed to all of these things in a greater degree than any other single force. If the public can be made to understand that, then many of our troubles will vanish.

This job is not solely one for advertising departments or public relations specialists to perform. They cannot do it alone. It is a responsibility of every single man and woman in the industry. If you believe in the industry, in its accomplishments and in its future, then tell all of your friends and acquaintances about it. Nothing can ruin a reputation quicker than a whispering campaign. Conversely, nothing can build goodwill and friendship quicker, or in a more lasting manner than word-of-mouth advertising.

### Preventing Mass Murder

Perhaps one of the greatest opportunities now confronting the industry is to make the streets and highways of this country as safe at night as they are in the daytime. One rarely picks up a newspaper without reading of death, injury and property damage occasioned by traffic accidents. It is significant that a high percentage of these occur at night.

Much has been done in recent years to perfect the equipment and the technique of lighting streets and highways so as to insure greater safety. We can safely say that from that standpoint our industry is ready to perform a real public service. The problem is one of perfecting a properly integrated and practicable program of highway lighting. In this we can tie our efforts in with those of the many agencies which today are concerning themselves with traffic hazards.

Lighting alone cannot totally prevent the mass murder which today is taking more lives than this country lost in all of its wars. But lighting can materially reduce this toll. Let us set out to see that every recognized night accident zone on our streets and highways is properly lighted. The return our industry would receive would be insignificant when compared to the inestimable return which would accrue to the public in lives saved and in injuries prevented. Such values as these cannot be expressed in dollars.

**The Home of Tomorrow**

One of the most satisfactory developments of recent years has been the proof of the stability of the domestic electrical market. Throughout the depression the domestic load has been a bulwark to the power companies. When other classes of load declined, the domestic customer increased his electrical usage and along with this bought millions of dollars worth of appliances.

Yet even in the domestic field the industry has a long way to go. In this territory only about 15 per cent of the homes have electric ranges and about 5 per cent electric water heaters. Half of the homes are without electric refrigerators. Our average domestic consumption approaches 1,000 kw.-hr., higher than the national average to be sure, but far below some of the individual records of certain power companies. An average of 2,000 kw.-hr. per home is not a fantastic figure. Achievement of this figure would mean that we would have to sell millions of dollars worth of appliances which would profit the manufacturer, the wholesaler and the retailer. The concomitant wiring volume would be something to gladden the hearts of the contractors. On top of all of this would be the market created by such a customer demand for general equipment, and for transmission and distribution material.

This is just another of our industry's many opportunities, the realization of which would mean profit for every person in the business. However, we will have to sharpen our salesmanship and increase the degree of industry cooperation in order to insure the complete electrification of the homes of tomorrow.

Earlier in this discussion I said that any of you could cite other opportunities. There are many jobs for us to accomplish. We can devise simpler methods for the public to do business with us by eliminating some of the accounting procedures which bring complaints. We can simplify our rate structures so that the public may have a better understanding of the cost of this commodity —electricity—which we sell. Despite the record progress we have made in this region in extending our service to the farmer, there are many opportunities for an even wider use of electrical service and equipment in agriculture. Our wonderful research laboratories are producing new techniques and new apparatus for us to bring before the public, and no one can foretell what they may produce tomorrow. In the field of engineering there are countless opportunities for improving the quality of our service, for reducing its cost and for increasing its usefulness. In industry there are many places where newer and better electrical processes can be applied.

In fact I think we can all agree that no industry has a brighter outlook nor one more fruitful in opportunities for its people. If we will keep constantly before us this vision of tomorrow, there never will be a time when the troubles of today get us down.

# Bonneville—and Realism

By LEROY A. GRETTUM
President, Northwest Electric Light & Power Assn.

BECAUSE the great Federal navigation and power project at Bonneville has been operating in its initial stage of development for nearly a year, and because this presents an immediate and practical problem to the whole electrical industry in Oregon and Washington, and to a somewhat lesser extent in Idaho, it is time for the industry to look at this situation realistically.

Construction of the Bonneville Dam has now been completed and two of the ultimate ten generators have been installed and ready for use since last July. These and a house unit give Bonneville a present capacity of about 90,000 kw. The ultimate capacity of this generating plant is intended to be 502,000 kw. available 90 per cent of the time. Foundations are being prepared for four more units, two of which have been authorized and will be in operation by 1941.

An elaborate and costly system of fish ways around the Bonneville Dam, including the use of elevators, was necessary because of the tremendously valuable salmon run in the Columbia River. Everything possible to protect these fish has been done. Since the commercial value of the annual salmon pack of this river is comparable to the value of any electric power production for many years to come, the results of these attempts to preserve the salmon industry are being watched with great interest by everybody concerned.

Because Bonneville is considered by the Federal government to be primarily a navigation project with power production only secondary, in the allocation of the total cost as between these purposes the major share was placed against navigation. Ocean going vessels can now go up the Columbia River to The Dalles by passing through the lock at Bonneville, and barge navigation between the inland empire and the coast area has been established.

By the terms of the law under which Bonneville Power Administration operates, and was created, half of all the energy developed at Bonneville is set aside until 1940 for the benefit of such public utility districts, municipalities or other agencies of government as may ask for it. The remaining half can be sold to anybody. So far there has been very little power sold—a small block to the town of Cascade Locks for street lighting, and a block to Northwestern Electric Co., used chiefly for testing the Bonneville generators when tied in with the interconnected private utility systems of the Northwest. There has been a great deal of activity on the part of the Bonneville Administration staff and employees encouraging the formation of people's utility districts through which it is claimed large quantities of Bonneville energy will ultimately be sold and distributed.

The lure held out by public ownership advocates is that power can be generated at Bonneville and transmitted

to the points of use at very much lower cost than would be the case if the generation and transmission facilities were privately owned. This contention, of course, is based upon the fact that the entire development (generation and transmission) is and will be owned by the Federal government and, therefore, wholly tax exempt; that a very large portion of the cost of the development will be charged to navigation and, therefore, will not be a part of the rate base upon which the government will expect, theoretically, to earn a return. In addition. because being a federally owned project, the rate of interest to be charged against cost allocated to power will be at a rate lower than any privately owned utility could possibly secure upon the entire cost of its development. It is these factors lowering cost that make Bonneville power cheap at the substations on Bonneville's own transmission system.

The scheme generally adopted by public ownership enthusiasts in Washington and Oregon is to urge the formation of people's utility districts under the respective laws of each state. These districts are intended to acquire by purchase, if possible, otherwise by condemnation, the properties of the existing electric utility in the area affected. The districts are intended to be financed by the sale of revenue bonds. A substantial number of towns and areas in the state of Washington have voted favorably on the creation of such districts, while in Oregon there has been considerable reluctance to plunge into the publicly owned power business, and nearly all attempts to do so have met with defeat by the voters. At the present time no such district in either state has been in actual operation long enough to permit the drawing of any conclusions as to their ultimate success or failure. Substantial sums of tax payers' money have been spent, although insignificant quantities of power have been delivered over newly created publicly owned systems, and none of such power comes from Bonneville.

### First School

There seem to be two schools of thought in the Pacific Northwest as to how Bonneville energy should be sold and used. One group encourages the construction of a far flung system of high voltage transmission and lower voltage distribution lines on the general theory that energy from this dam should be carried to the farthest reaches of both states and over into Idaho, or even Montana. They stand for the postage stamp rate idea, feeling generally that no matter where the customer lives or how far he is from the source of supply he should pay about the same

GRETTUM

for service as those living immediately adjacent to the dam. There is much loose talk from this group about the further extension of service in rural areas and the development of very large average annual domestic consumptions. In this way, it is claimed that not only a market for energy immediately available, but for the whole capacity of Bonneville, will be quickly developed.

Needless to say, those of us who are now actually engaged in the operation of electric utilities in the area in question are very doubtful about the soundness of such a program. We know only too well, from actual experience, that the cost of generation has remarkably little to do with the cost to the ultimate consumer, particularly in rural areas. We also know, and have learned this too in the school of experience, that the mere provision of energized service wires on the side of a house is no guarantee that there will quickly be a large average annual use of energy by the customer. The cost of wiring the customer's premises, the cost of purchasing the necessary appliances, and above all the kind of agricultural enterprise in which the rural customer may be engaged—these are the things which influence the customer's use of electric energy. Other important factors are the climate in that particular locality and the presence of absence of cheap and satisfactory fuels.

### Second School

The other general school of thought regarding the use of Bonneville power in the Pacific Northwest is to keep the rates very low at the dam in the hope of attracting some of the comparatively few industries in which the cost of power is a substantial part of the total cost of the finished product. Not only because Bonneville power at the dam will be really cheap, but because that cheap power is located on tidewater, many people feel that there is a good chance to bring new industries and new pay rolls to Washington and Oregon. Following out this general line of thought, the proper method of disposal of Bonneville energy would be to sell it largely in the areas immediately adjacent to the source of power. Using transmission lines already in existence, or now being built by the Bonneville Administration, there is a market in the Portland - Vancouver area for large quantities of energy. The logical use of Bonneville energy should be to displace, insofar as possible, all steam-produced energy where the fuel cost is greater than the rate at which Bonneville energy can be substituted and, in addition thereto, to supply all requirements of the market in excess of present privately owned hydro electric capacities.

### Realism

In these circumstances the existing utilities in Washington and Oregon have adopted a realistic and practical attitude. Over and over again they have assured their customers and the public in general that if given an opportunity to do so, they will be glad to absorb all the Bonneville energy possible and pass any resultant savings on to the customer at once in the form of rate reductions. This is a sincere and straightforward policy to which we all subscribe. We have repeatedly pledged ourselves to pass on the resultant savings to the customer, and the state regulatory bodies have further said that they would make very sure that we did this.

Under such a program there will be great benefits quickly forthcoming to the people of the Pacific Northwest and to the Federal government. We take the stand without hesitancy that we have been for years and are now doing an outstanding job of bringing electric service to the greatest possible number of people in a vast and sparcely settled area at the lowest possible cost. Considering the taxes we pay, and the part we have played in building up the communities which we serve, we challenge anybody to do a better job for less money.

I take this opportunity to express my appreciation to the officers of the association, the section and committee chairmen, and to all those who have cooperated so heartily in making this association year such a pleasant one for the president and so beneficial to all its members and to the industry at large.

# Light Paints the Fair

ENCHANTMENT? It depends upon the atmosphere created by the surroundings and the mood of the beholder. Those who come to Golden Gate International Exposition in a mood to be enchanted by beauty, find there the requisite atmosphere of light, color and spacious majesty. It takes little imagination to transport oneself to fabled and fantastic fairylands when night falls and soft colors tint in exotic hues the towering walls of its courts. Not the cruder raw colors of yesterday's floodlighting, but new and subtle tones hitherto unattainable in light.

General Electric Co. illuminating laboratory engineers, under the direction of A. F. Dickerson, of Schenectady, had complete charge of the exterior illumination design for the exposition. Although Mr. Dickerson had worked with the late D'Arcy Ryan at the 1915 fair, research and development had placed new palettes of color at his command. He was permitted thus to decorate the graceful towers and entire walls of Golden Gate International Exposition in colors that the Tower of Jewels in the 1915 Panama Pacific International Exposition only hinted at in stray gleams of light broken by its scintillating prisms.

New sources of light, principally the General Electric fluorescent tubular lamp, and the capillary mercury vapor lamp, were available now for the first time to modulate and enrich the already well developed light technique of Mazda lamps and their reflectors and color filters.

By day the great courts of this Treasure Island fair are simple and dignified —great expanses of softly, almost imperceptibly tinted wall surface relieved by restrained decoration suggesting the cultures of the Pacific area—Mayan, Inca, China, Sumatra, Javanese, Cambodia, Japan, and the East Indies. The flower gardens at the footings of these high walls and towers, the fountains playing musically and daintily, create a daytime garden paradise such as not even Allah knew nor Omar dreamt.

Then when night descends over this island, a complete new fairyland—one of the Arabian Nights adventures—springs into being. The great wall spaces are treated with soft shades of new colors unattainable before now. Deep blues bordering on purple in the Court of the Moon cover entire areas of massive wall space and towers. Rich reds fill the decorative niches and grills. Amber underwater floodlights turn the fountain streams to flowing liquid gold. A bluish green under the trees brings forth the natural foliage color of this lush garden of full grown trees and shrubs.

In the Court of Reflections the mirror pools reflect another color scheme. A soft salmon pink covers the high walls from base to top, relieved by single window niches in blue on silver. The economy of these new fluorescent light sources is well exemplified in the expanse of wall space so smoothly and adequately covered by the comparatively few such new type General Electric units employed.

**New light sources provide new and subtle colors that transform Treasure Island into a magic fairyland at night. Lighting, flowers and architecture are acclaimed by every visitor.**

Golden fluorescent light tints the crest of the high walls of that stately and romantic Court of the Seven Seas, where figureheads of ships jut over the parapets in long lines on either side. Below each ship's prow is a tall niche treated to a new lighting technique entirely. The delicate bas-relief mural inside the niche is painted in almost invisible fluorescent paint. Concealed sources of "black light" or ultra-violet light invisible to the eye flood these niches and activate the fluorescent paints to produce a dainty and ethereal underwater scene of iridescent fishes and mermaids.

Pacifica, giant 80-ft. statue, presides over the Court of Pacifica, the court into which those who come by ferry enter first. Through the water of fountains below she is lighted in flickering light that gives the illusion of motion to her stately figure. Behind her hangs a giant steel star-studded screen behind which a changing background of color is presented. Through a thyratron-controlled color changer the colors go through a cycle from blue to purple and red to amber and back again while the colors in the center of the fountain in the middle of the same Court change in synchronism.

The East towers, facing the Lake of the Nations are distinctly Cambodian; the golden murals along the wall spaces are monumental in size. Here a rich golden amber gives to these mural reliefs and to the gold and red of the tower decoration the rich splendor associated with the Far East. Electric soil heating cable hastened the growth of the tall stalks of bamboo which lend their touch to the eastern atmosphere.

With its central fountain shooting a multitude of tiny streams of water into white underwater floodlights, the Court of Flowers is one of the most beautiful of sights, largely because of its pattern of blossoms kept perpetually in bloom by skilled gardeners. The white floodlighted arch at one entrance and the golden tips of the Towers of the East above the other entrance, the soft rose tints from fluorescent lamps in the upper walls and lavendar from lumiline lamps in the arches of the surrounding corridors, the blue green light that illumines the trees combine to produce a garden of unsurpassed loveliness.

Color cameras are busy at Golden Gate International Exposition as fans and professionals alike seek to capture in film some of these subtle color scenes and preserve them beyond the transitory period of the Treasure Island fair. General Electric Co. has had made a series of large color pictures which are being printed in an official booklet and will soon be available at the Fair. The two color pages following are reproduced from that booklet, which will bear the title, "Magic in the Night," and are reproduced here by courtesy of the General Electric Co. Photographed by Gabriel Moulin, official photographer, the collection of color pictures is as near to faithful reproduction of the delicate colors as present technique permits.

Color plates by courtesy of General Electric Co

TOWER OF THE SOUTH IN THE COURT OF THE MOON

Exterior Illumination Engineers for G. G. I. E

Color plates by courtesy of General Electric Co.

TOWERS OF THE EAST FROM LAGOON OF THE NATIONS

Exterior Illumination Engineers for G. G. I. E.

PRINT IN BINDING

Skeleton house with which the Electrical Service League of B. C. dramatized wiring to the public

# *Whose job*
# Adequate Wiring Sales?

## By S. F. Ricketts

HAVE you ever had that sinking feeling about your ability to keep up-to-date in the electrical business? You have thought of yourself as an expert in your own line and suddenly found your youngest helper in the shop or fresh from university away ahead on some of the vital and modern factors of the game, or that some competitor had information you never knew existed. It makes you agree with that statement that "Youth is not a time of life, it is a state of mind."

But wiring is so mundane, so ordinary, that no one can get worked up over it. When you say "adequate wiring" *YOU* know exactly what *you* mean.

After all, the basic factors connected with wiring and conductors in general remain the same. We are still using copper wire and haven't discovered anything economically better, except for extra high tension line work. Ohm's law still remains true—although herein lies many a secret connected with "inadequate wiring." One thousand amp. per square in. is still correct as current density for conductors, and No. 14 is still calculated at 15 amp., despite the fact that the telegraph business has been revolutionized and 24 circuits are being carried *at once* on one pair of modern telegraph wires and 196 messages transmitted simultaneously. But we haven't yet found a way to supply range current and lighting and apparatus current simultaneously over a pair of 14's to Mrs. Smith.

In the meantime, your reaction to this new campaign slogan "Adequate Wiring" is, "Adequate for what? Today or tomorrow?" If the fundamental factors are as true today as they were twenty years ago, wherein lies the inadequacy? Simply in the increase of the use of electricity in the complexity of our requirements for our daily life and orbit. That's all, and people get over it or around it in various ways—or else they don't. The whole story is wrapped up in these last words.

Are we really convinced of the inadequacy of wiring, which is the negative aspect to a positive campaign based on conviction? Is business really hindered by lack of adequate wiring?

Salesmen are selling more and more ranges; power load is going on the lines for the utilities in chunks; miles of pipe and wire are going over the distributors' counters; carloads of modern fixtures are coming to town; radio sales are leaping year by year; whilst the streets never looked so bright. But at what cost in effort and salesmanship? That's why it affects each one of us.

### Its Appeal

This question of "Adequate Wiring" has a different appeal to the four groups actually interested in the campaign.

1. The importance of adequate wiring to the *consumer.*
2. The opportunity for better industry cooperation and understanding with the most important link in the industry—*the electrical contractor.*
3. The value in lessened sales resistance to *the manufacturer and distributor.*
4. The ultimate and continued benefit to the utility.

At first I had reversed the order, but realized that this has been the mistake in our thinking for too long. The utility did not exist before the consumer and it is the discovery of the consumers' requirements which has stimulated all our efforts and prompted the action of producers everywhere.

When we lay our industry plans for the year of production and distribution, and we make our sales allotments, we use as a measuring rod the consumers' present or deferred purchasing power to absorb apparatus and to use electricity. Quotas are becoming a science.

Changing desire into ownership and use is supposed to be merely a question of financing, but there is so often "the joker," and this is the point, for the potential consumer invariably asks, how can I use it when I have it? What is our answer? Briefly it will be "adequate wiring."

### The Electrical Contractor

This is not the first time the contractor has found himself caught up in a sales promotional campaign, sometimes to his advantage and sometimes to his disadvantage. A few years ago we were faced with that magic stimulant "free wiring," the suggestion being that the electricians' stuff was so cheap that it was easy enough to throw it in on the bargain counter to the customer. The reaction proved too much for the members of the Vancouver Electrical Assn., and at their request, the words were changed to "free installation" to give instead, the desired impression that the idea of sales resistance from inadequate wiring need not be a stumbling block to a sale. Consumers, however, are becoming educated on bargain hunting and there is in their minds now the question of who ultimately finances the free items. Consumers are still willing to assume it if the extraction is made fairly painless or is buried deeply enough.

But "free installation" does not begin to cover the situation now-a-days since the "Science of Seeing" and the "Power for Living" campaigns have changed the emphasis from a range installation to the complete electrical system, gen-

Exterior Illumination Engineers for G. I. E.
Color slides by courtesy of General Electric Co.
TOWERS OF THE EAST FROM LAGOON OF THE NATIONS

eral lighting, apparatus, plugs, decorative lighting, air-conditioning and hidden units, for commercial as well as domestic users. We now have to make a frontal attack on the real difficulty, viz.: inadequate wiring in the old buildings or the provision in the plans of new buildings for really adequate wiring. It seems that the electrical contractor's sphere is at last being recognized as representing the position of such strangulation as the industry is experiencing; and it cannot be just dismissed at that, for you have only to consider its importance for a moment to realize that a tremendous educational program must result.

We have the potential customers; we have the goods on the shelves and the sales force behind them, but no one doing a proper selling job for the contractor, because no one technically knows how to do it but the contractor, and his financial wings have been clipped by the actions of competitive interests, who have not always worked cooperatively to make it possible for the contractor to be something more than "labor for hire." Selling adequate wiring is not spectacular enough for high pressure salesmen, nor can it be sold from the desk by long distance executives. It needs intelligence and technical experience. Given cooperation and the opportunity to live a less restricted existence, the electrical contractor could give more time and energy to the study. But instead, manufacturers and wholesalers are daily putting additional competition into the contracting business and making it a grind for existence. There have been notable instances where "successful contractors" have given a great deal of impetus to the industry.

Cooperation is not merely sentiment and words, nor is it just financial contributions and dictatorship, *it is a measure of understanding in policy between the branches of the industry which will give the contractor an equality and a reasonable living* and enable him to take his part in this campaign.

#### Manufacturer and Distributor

This group known as the manufacturer, the wholesaler and distributor, covers such a variety and number of interests and individuals, together with such a wealth of power and research in the industry, that it would be easy to subdivide it in relation to their interest in this Adequate Wiring campaign. Actually they represent that group mentioned previously as providing the goods on the shelves, budgeting for sales with all their wealth of money and experience, yet finding the going much harder because of the restricted capacity of the consumer to use their goods, electric appliances and equipment.

This is not the first campaign they have been into; in fact the National Adequate Wiring Bureau of New York, in making a progress report recently, paid tribute to the fine precedent of promotional campaigns which have been making Industry history during the past fifteen or twenty years. It was these earlier promotions which caused attention to be focused on the wiring problems as being the stumbling block in the way of sales. The earlier successes of the Red Seal Plan for certified installations; the outlet campaign; the continued activities of the Electrical Service Leagues and the many sales campaigns, all formed a basis for the launching of this Adequate Wiring Campaign, which is the greatest All-Industry program.

Yet as the editor of the National Adequate Wiring Bureau's publication remarks, "Anyone who thinks that 130 million individuals (of America) can get a full appreciation of the benefit to them of adequately wired homes in a month or two, just isn't thinking straight. Boil it down to your own community and analyze the job to be done, on the basis of your knowledge of your fellow citizens." This is timely advice to any who think the campaign is over with our recent demonstration and preliminary publicity.

#### The Utility

What has been said of the promotional activities and presentation of the program with reference to the manufacturers and distributors, applies equally to the light and power companies and the electrical service leagues. The Adequate Wiring program is fundamentally a public service and it is through a utility which reaches every home the message can best be distributed. Fieldmen representing all interests of the industry have given the AWP first place and naturally we in this particular region find the greatest enthusiasm in the B. C. Electric Railway Co. and the Electrical Service League of British Columbia. One can hardly say the AWP has supplanted the Red Seal Campaign in Vancouver, but rather that it has given it fresh impetus with increased aim and new terminology.

A great responsibility rests upon the League and fieldmen connected with the AWP; first to keep this interest alive through the whirl of counter-attractions and individual cares; and secondly to be ready with practical suggestions and plans for continued promotional effort. It is so easy for individuals to slip from the heights of interested activity to the depths of self-complacency, that someone has to be ready to rekindle the fires of enthusiasm, or better still to keep them alight.

Never was the way better prepared for a program than was the case when the "Handbook of Interior Wiring Design" was issued in 1937 to break ground for the AWP. This text book should be made the manual for study groups throughout the industry, for it covers the field from the fundamentals of light and of vision, through equipment and terminology, with specifications and drawings, to adequacy in wiring in all fields. To say the subject of Adequate Wiring is dry and uninteresting with these 80 pages of fascinating data and facts before you, is a sign that you are not engaged in the right industry.

It is interesting to note that most of the Canadian Government specifications are calling for No. 12 wire and higher standards on public works buildings, showing that Ottawa has profited by a study of these adequacy standards. There is also a move towards no-fuse unit panels and other modern features in all major government specifications.

#### Wiring Methods

Let me commend for your careful consideration, an article in *Electrical World* of May 7, 1938, by C. W. Kellogg, president, Edison Electrical Institute, which approaches the subject from the point of view of the need to secure "Lower cost methods to open up opportunities for selling rewiring in older buildings, which is today's largest market for electrical construction, labor and material."

There is material for a real discussion in the suggested changes in the National Electrical Code which he proposes.

The common objective of these proposals, some of which contemplate specific and substantial changes in present practices, is the much freer use of copper, more branch circuits and more outlets in interior wiring.

Some of these suggestions have already been considered by the Vancouver Electrical Assn., whilst others have been reported on through the Canadian Code Committee. We have made a local saving through a carefully combined service for range and lighting in old houses, brought about by cooperative study with the Vancouver city inspection department. The same cooperative spirit which has made our joint efforts successful in the past, applied to this and other problems connected with adequate wiring are sure to bring solutions which will make business for all of the industry and provide the much desired adequacy to the customer.

*Official photo, U. S. Army Air Corps*

# Defending the Pacific Coast

***How utility communications fit into a warning service which helps safeguard the West from invasion by air***

By Col. L. H. Stanford

WE of the Army are, of course, by the very nature of our duty, concerned with giving full consideration to whatever may happen to this country from storms, floods and other natural catastrophes; from internal strife and dissension, and from international situations. Plans evolved to meet these circumstances are not divulged to the public; one reason being that they are what we might term "trade secrets" and another being that undue publicity would give rise to needless alarm. Situated as this country is, it is doubtful if we would be subjected to an attack from any nation from over the seas. Broad expanses of water give us a large measure of security.

However, world unrest, development of aircraft, and the fact this country has resources beyond those of any other nation are causing our security to diminish as time goes on. No matter how great our security may be, it behooves us to consider what might happen, even though the possibility of the occurrence may be very remote.

It is but natural that power men should have an interest in what the War Department has considered with respect to the utilization of power facilities in event of a possible but not probable war. Fundamental to such

a discussion of facilities in connection with the defense of the Pacific Coast is the national organization for defense.

(Top of page) Bombers in action fly by threes. This flight consists of Douglas B18 bombers (sky background), and Boeing B17 flying fortresses (water background). Speed of the modern bomber approaches that of the pursuit

The defensive agencies of our nation are, of course, the Army and the Navy. The mission of the Navy is to meet the enemy at sea and, insofar as possible, to destroy him upon the waters; to protect movements of our own troops in convoy across the waters, and to convey to our shore establishments all information possible of the disposition and movements of enemy forces. The Navy on the Pacific Coast is organized into the Pacific fleet. The shore establishments are at three district headquarters, namely, the 11th, 12th, and 13th Naval Districts, located at San Diego, San Francisco and Seattle. The mission of the Army is to protect land establishments and the civilian population from sea and air bombardment by such enemy elements as may have eluded the Navy; to prevent enemy landings, and to defeat such enemy troops as may be in its front.

For purposes of administration and mobilization the War Department has divided the United States into nine Corps Areas. Each of these is capable of raising upon initial mobilization, throughout the Regular Army establishments and the National Guard organized therein, an Army corps. The Corps Areas are, in turn, grouped into Army areas. Thus we find that the

1st, 2d, and 3d Corps Areas constitute the First Army Area; the 5th and 6th Corps Areas the Second Army Area; the 4th and 8th Corps Area the Third Army Area and the 7th and 9th Corps Areas the Fourth Army Area.

Our particular interest is in this last, inasmuch as the entire Pacific Coast is a portion of the 9th Corps Area. The 9th Corps Area embraces the States of Washington, Oregon, California, Idaho, Nevada, Utah, Wyoming and Montana. Its headquarters is at the Presidio of San Francisco. It contains one Regular Army division and two National Guard divisions. In addition, there are a regiment of cavalry, and Coast Artilery troops, the latter being stationed at the Harbor Defenses of San Diego, Los Angeles, San Francisco, the Columbia and Puget Sound. Coast Artillery Harbor Defense troops are organized into the 9th Coast Artillery District with headquarters at Fort Winfield Scott, San Francisco.

In an event of an attempted invasion, the Harbor Defense establishments of the Coast Artillery would deny to the enemy the use of our most important harbors and force the enemy to attempt to land at less favorable points. Any such attempt to land troops would be met by the mobile forces assisted by the heavy mobile artillery. The Coast Artillery is charged also with detecting the approach of enemy aircraft and with warning the Air Corps anti-aircraft artillery and the civilian population of the impending attack, and then with firing upon the attacking airplanes should they fly over a defended area. Should a mobilization be ordered, the Coast Artillery organization would come into being for actively defending the coast.

### The Bomber's Mission

Prior to considering the measures to be taken to provide for an anti-aircraft defense, let us briefly consider some of the characteristics of aircraft and the problems which face them in making an attack. Aircraft is in general divided into four classifications, namely, Observation, Pursuit, Attack, and Bombardment. Bombardment aviation consists of large multi-motored airplanes capable of carrying several tons of bombs, and its prime mission is dropping these bombs over establishments justifying attack.

In general, it is not expected that a bomber would be employed against a group of men or temporary emplacements. Normal target for this aviation would be permanently emplaced artillery, large industrial establishments, concentrations of troops, munitions plants, and large establishments of essential utilities, as well as areas where the population is congested, as in cities. All of this aviation flies at speeds ranging from 150 to possiby 400 or 450 miles per hr. In bombing, the altitude at which the aviation is flown must be sufficient to allow the ships to be free from the effect of bombs they drop and relatively free from the effect of anti-aircraft fire from the ground.

The first consideration indicates that over undeveloped areas bombing may be expected at altitudes of 2,000 to 5,000 ft. However, the latter consideration makes it necessary that bombing be undertaken from altitudes of better than 15,000 ft. over areas which are defended with anti-aircraft artillery.

In the forward part of each bomber will be found a bombardier whose duty it is to adjust the bomb sight, and, when the target appears in his sight, to release the bombs. Upon this bomb sight must be set off the air speed of the ship, the altitude, the drift, and several other factors. Obviously the bomb sight cannot be completely adjusted until the last few seconds prior to arrival over the target, and if the work of the bombardier can be interfered with during these critical moments, the accuracy of the bombing is lost.

Let us assume that some period such as 45 sec. might be required for the last-moment operations of the bombardier.

A bomb falls by gravity, and the time of its descent may be approximated by the well-known formula: $S=\frac{1}{2}GT^2$. At the moment of its release the bomb is being transported forward at the speed of the airplane. Let us assume that a bomb is dropped from an altitude of 15,000 ft. by an airplane flying at 200 mi. per hr. The time of flight of the bomb would then be about 30.5 sec. and in the meantime the airplane would have traveled 3,000 yards.

Thus the bomb-release line is approximately 3,000 yards from the target. At 200 mi. per hr., an airplane will travel 4,400 yards in the 45 sec. allowed to the bombardier for his final adjustments. Beyond the bomb-release line, therefore, lies a critical area 4,400 yds. in depth. If, over this area, it is possible to interrupt the bombardier or the plane, the bombing will be less accurate and probably ineffectual.

Aviation flies in a variety of formations varying in width, depth and altitude, the basic formation being that of a flight of three ships flying in a V. Each type of airplane has a distinctive appearance and a distinctive sound. A trained observer can readily identify the type of plane from its silhouette against the sky or by its sound if the plane is not visible. From sound, the observer can fairly accurately estimate the number of airplanes and can accurately determine their location. It is not difficult to estimate speed and altitude with a fair degree of accuracy. It is on these factors that we rely for identification and intelligence of enemy aircraft from ground stations.

Anti-aircraft artillery is organized into regiments which are equipped with anti-aircraft guns, fire-control equip-

**Night action. Three-inch anti-aircraft guns are the end-points in a network of communications which is essential to successfully repulsing air raids**

*Photo by U. S. Army Signal Corps*

*Official photo, U. S. Army Air Corps*

**Challenging the ultimate in air speed is this Curtiss XP40 pursuit, powered by in-line engine, and unofficially reported to have exceeded 500 mi. per hour**

ment, searchlights, and sound locators. The modern 3-in. anti-aircraft gun, using the mechanical fuse and a muzzle velocity of 2,800 ft. per sec., can deliver fire upon a target at an altitude of 17,000 ft. and 6,000 yards horizontally from the gun. These guns are, in general, emplaced approximately along the bomb-release line and are so spaced that at least two batteries cover each portion of the critical area. Prevailing winds and the nature of the surrounding terrain very often influence the location of the guns and the density of the guns will be greatest over the expected avenues of approach available to the enemy.

Anti-aircraft searchlights are emplaced on the arcs of circles surrounding the target, having radii in general approximately one-half the distance to the bomb-release line for the inner circle of lights, and to approximately 10,000 yards beyond the circle of the guns for the outer ring of searchlights. Sound locators are placed near the searchlights. Five to 8 mi. beyond the outer ring of searchlights is a ring of listening or observation posts.

**Intelligence Center**

Each observation post, searchlight and sound locator is connected by telephone to the center of the defended area from which telephone lines radiate to the gun batteries. As soon as the sound locators pick up and locate the approaching aircraft, this intelligence is communicated to the gun batteries and the airplanes are taken under fire as they come within the range of the guns.

When bombing takes place at night, the target is illuminated by the searchlights as soon as possible after its general location is determined by the sound locator, and the approaching airplanes are kept illuminated by searchlights the entire time that they are within the range of the guns. Clouds, surrounding terrain and extraneous noises are factors which interfere with the prompt detection of approaching aircraft.

The above information or intelligence network is established by the anti-aircraft artillery for the fire-control of the batteries, and it is not to be confused with the aircraft warning service which covers a wide expanse of territory and is not organized for any single target but for all targets within a defended area.

Thus it is highly desirable that an extensive warning service be established far beyond the range of the aircraft intelligence net above described, to enable the defending troops to receive timely warning of the approach of the enemy. Such a warning net for any given locality woud consist of observation stations placed in general on concentric circles having radii of 40 to 60 mi., 80 to 100 mi. and 120 to 150 mi. These stations should be not more than 10 mi. apart. It will be observed that the complete warning service of any single target would therefore involve the establishment of about 300 observation stations manned for 24-hour operation.

For a warning service covering an area in which there were several targets, the station locations would approximate those for a single target but would also be established along several radii like the spokes of a wheel. Each station would be connected by some means of communication with the center of the defended area.

The information center to which the lines of the warning service converge is also provided with communication to other defense elements from which intelligence will be received, such as the offshore and inshore patrols of the Navy.

Information received from any source is plotted on a map, and two or more reports of any enemy formations will reveal the course and speed of the approach. All possible information of impending attack is promptly furnished the airdromes and the anti-aircraft artillery commands. It is likewise furnished to other troops by land wire and to the civilian population through commercial radio broadcasting stations.

Thus nearly as much personnel is required in manning the anti-aircraft warning service as in manning the batteries defending the area. Important as this anti-aircraft warning service is, it is manifestly impossible to spare from combat purposes sufficient personnel to operate it, and the means for manning any such vast network has presented quite a problem to the War Department.

Several solutions of the problem have been offered, depending upon local conditions. However, here in the West we are fortunate that along the Pacific Coast there is an extensive power development. Each of these power systems is provided with extensive communication channels.

Through the cooperation of Southern California Edison Co. with Colonel Thiele of the 63d Coast Artillery, an anti-aircraft warning service utilizing communications channels of power lines, augmented by forestry lines, was organized in Southern California for the General Headquarters Air Force maneuvers held at Muroc Dry Lake in 1937. This initial network was extended and improved and again used in the exercises held in April 1938.

The personnel used for the observing stations was the personnel which manned the various substations of the power companies and forestry service observation stations embraced by the system.

Communications from these observing stations followed the regularly accepted form of the flash message, for example:

"Flash 1 High Bay."

This means that station No. 1 has observed airplanes at high altitude in the sector bay. Such a message may be amplified by repeating the number and type of planes, the time heard or seen, and the direction of flight. Thus:

"Flash No. 1, Six Bombers, 1:56, High Bay Southwest."

Such a report, when relayed through the various substations of the network to the central office, would be plotted upon a board and its value determined from information received from other nearby stations. The course of the approaching airplane would be plotted from successive observations which would prepare the anti-aircraft defense to pick up the target when it came within the combat intelligence system immediately surrounding the target. Were the information of value to a more distant area, it would be relayed at once to the information center charged with the protection of the apparent destination of the flight.

### Southern California Problem

In the April 1938 exercises the information center was established at the Alhambra station of the Southern California Edison Co. Relay points were established at important substations.

Personnel regularly assigned to duty at the various stations were given only very brief training in what was expected of them. With this meager training and the silhouettes of the various types airplanes furnished them, they were able to identify accurately the various types of airplanes observed and to report promptly and efficiently all flights made over their stations. Even from the outermost stations the reports reached the information center only a minute or so after the airplanes had been observed from these points.

The efficiency of this aircraft warning service, established around the communications network of the Southern California Edison Co., augmented by the networks of adjacent power companies and the Federal and State Forestry Services, has led to the development of aircraft warning service arrangements for the protection of areas around San Francisco and Monterey, and Portland and Seattle.

The probem of protecting Los Angeles and San Diego, as well as San Francisco and Monterey, is a relatively simple one because of the small number of agencies to be considered in establishing each network. However, the greater number of companies represented in Washington and Oregon makes the problem for the protection of Portland and Seattle somewhat more complex.

In both Washington and Oregon, and in Northern California, there are likewise many dead spaces which are not adequately covered by any kind of communication. This is apparent in Fig. 1. It would probably be necessary to lease from the telephone company or telegraph companies wire lines to interconnect the centers of the power companies which are not provided with facilities for interconnection over their own lines.

In the network of Southern California Edison, use was made of mobile radio transmitters to bridge gaps not covered by wire service, and this is a possible answer to gaps existing elsewhere along the coast.

The factors which make the utilization of the lines of the power companies ideal for this work are that their personnel is of high intelligence and widely scattered over the area to be covered; that their lines of communication feed to central locations suitable for the concentration of information from the observation stations, and that the use of these lines for this purpose leaves the telephone and telegraph lines free for the tactical use of mobile troops.

### Tactical Uses

There might, however, arise situations in which the lines of the power companies might well be required also for the use of tactical troops. Imagine, for example, that an enemy has landed at San Francisco and at Los Angeles and has seized those two centers. The telephone lines along the coast would be well nigh useless to the troops defending the country and striving to dislodge the enemy because of the fact that below Gilroy there is no telephone line connecting the coastal telephone routes with the valley telephone routes. It is possible that the coastal telephone lines between Salinas and Ventura might at any one of several points temporarily be interconnected through the facilities of the power system with the valley telephone lines connecting Stockton, Fresno, and Bakersfield until telephone plant could be constructed.

Among the targets which enemy aviation might seek out are various sources of power such as substations, dams, etc., supplying the coast. The damage of these installations would cripple industry beyond measure and would also affect water supply to the population in general. Thus in assisting the Army in its mission of defending the Pacific Coast by placing the communication channels at the disposal of the Army, electric utilities are not only permitting their facilities to be used for the general good but are, in fact, enabling the Army better to defend the utilities' own critical establishments.

It is noteworthy that the Army must have a system of intelligence service for the anti-aircraft defense of the Pacific Coast. The voluntary assistance rendered by the power companies for this work is appreciated by the military personnel. It is realized that the assistance which the Army has received and will receive in the future has been offered patriotically, without any great thought to the benefit which will accrue to the power industry from the utilization of its facilities by the military forces.

Fig. 1—Major electric utilities in the Ninth Corps Area: (1) Puget Sound Power & Light Co.; (2) California-Oregon Power Co.; (3) Pacific Gas and Electric Co.; (4) San Joaquin Power Division, PG&E; (5) Southern California Edison Co.; (6) San Diego Consolidated Gas & Electric Co.; (7) Nevada California Electric Corp.; (8) Sierra Pacific Power Co.; (9) Pacific Power & Light Co.; (10) Washington Water Power Co.; (11) Idaho Power Co.; (12) Arizona Power Co.; (13) Standard Gas & Electric Co.; (14) Montana Power Co.; (15) Mountain States Power Co. (16) Portland General Electric Co.; (17) Northwestern Electric Co.

# Do Dealers *Want* Sales Training?

***Answered by a PCEA survey***

To bring a new and well trained source of salesmen into the electric appliance field the Electrical Development League of Southern California and Los Angeles City College are working together on a salesmen's training program. Here E. C. Adams, of the League (left), and J. J. Stigman (right), of the L. A. Bureau of Power & Light are teaching the salesmen electric cooking as a first step to better selling

IT ALL boils down to the salesman talking to his prospect. Does he close the sale or does he fail? All the preparation of the manufacturer, the design in the product, the advertising and promotion, points to that moment of personal contact when salesman talks to prospect. The wholesalers' efforts, resulting in the stock placed on the dealer's floor, have also been pointed to this crucial moment. The dealer himself—his store, his window displays, his advertising, his sales force, are all concentrated upon that ultimate chance to talk to the prospect and to persuade her to buy.

Discounting the percentage of just ornery shoppers, who never intend to buy anyhow but like to pretend they may, does the salesman make as good use of that big moment as he might? If he were better trained could he close the sale oftener? How effective is he in proportion to what he might be?

These are mighty important questions to the entire electrical industry. For that salesman, at point of contact, is the measure of this entire industry's prosperity. If he fails, the entire effort of the dealers, wholesalers, manufacturers, and utilities backs up. The log jam starts. Until the flow of products to consumer is resumed, the whole industry marks time. Manufacturer's production slows up—employment suffers. Wholesalers cannot move the product along. Dealer's stock stays on the floor or shelves—his money tied up. And the salesman himself does not earn his pay. His position is precarious.

So it is important to everyone, this matter of sales training, sales effectiveness. When the utilities were the big merchandisers, with full control of their own selling organizations, sales training was a vital part of their programs. It still is where utilities do any merchandising. Sales training likewise is a vital part of the procedure of the strong mail order houses and chain stores. Therefore, to any independent dealer competing with these better trained organizations, the question of sales training for his own men and women is important, whether he realizes it or not.

In recognition of this serious problem of modern appliance distribution, the Pacific Coast Electrical Assn., for the past three years has had a Sales Training Committee seeking the answer to these questions. The first year's committee disclosed the need for such sales training among dealer organizations. The second year's committee came to the conclusion that before any program could be initiated much more factual data as to the actual size and complexity of the problem were necessary. Considering the known differences of policy among the various member companies of the association, the committee did not feel that a broad program could be attempted unless the facts bore out the need for a wide-scale operation. It was felt also that it was necessary to know more of what the dealer's reaction to such a program would be, and whether there existed any deep-seated desire on the part of manufacturers, wholesalers, and utilities to undertake such a program.

The late H. M. Crawford, general sales manager of Pacific Gas and Electric Co., in a letter to the committee expressed the policy which the committee later adopted, in these words: "First ascertain just what the field conditions are with merchants in enough stores in different communities to determine the merchant's side of the question. This should be done in a very careful manner to develop the real facts. Such a study could then be a guide as to what is needed. Second, some attempt could be made on the part of the committee to inventory the methods or agencies available for the solution—such a list of methods or agencies could then be submitted to the membership of the association in a way which would leave it to the individual company's judgment as to which method or agency they could best employ to fit their local situation."

To carry on such an objective a dealer questionnaire was prepared, and through the cooperation of the utility members of the Association, was handled by the dealer contact representatives of the utilities in a cross-section or spot survey. It was apparent to the committee that no appreciable return of the questionnaire could be expected if mailed to each dealer. Utility salesmen and contact representatives would have the best entree to the dealers' confidence, could get a more effective dealer response to the questionnaire, and perform the survey at the least overall expenditure of time, money, and energy.

### Dealer Surveys

These dealer surveys were conducted in limited but typical cities, by Pacific Gas and Electric Co., San Joaquin Light & Power and Midland Counties Public Service Corp., Coast Counties Gas and Electric Co., San Diego Consolidated Gas and Electric Co., Tucson Gas and Electric Light & Power Co., Sierra Pacific Power Co., and Southern California Edison Co. A total of 333 dealers were interviewed out of an estimated total of 1,656 dealers in the territories of these companies.

These interviews included 171 strictly electrical stores, 52 department stores, 39 furniture stores, ten music stores handling appliances, 45 hardware stores, three auto service stores handling appliances, and 24 miscellaneous

stores. It was interesting that these merchants had approximately an equal number of inside and outside salesmen —696 outside salesmen, 656 inside salesmen. To the question as to the average number of years salesmen had worked for the store, very unsatisfactory answers were obtained, but it was significant that 608 of the 1,452 total salesmen, less than half, had worked with their stores for over two years.

Answers to the question as to where salesmen are obtained were varied and indefinite. Among them were listed, "advertising in the papers, applicants, agencies, sent by the wholesale men, high schools, installation and service departments, by chance, from the family, from other dealers," and others stated it was no problem to get salesmen. These answers indicate that there is no source of trained sales personnel available to dealers and that most dealer salesmen are chosen by personal interview. An indication of the need for a source of trained sales personnel for dealers is given by these responses.

Because the opinion had been expressed that the method of pay of salesmen might have a bearing on the situation, questions were asked as to whether the salesmen were paid a flat salary, a salary and commission, or by commission only. Of the total, 78 dealers paid a flat salary, 113 salary and commission, and 135 straight commission. This does not account for the entire list but does give a proportionate figure which may indicate the trend of compensation.

What kind of sales training had been given the dealer salesmen, and by whom, was a next important question. Of the dealers 202 indicated that product training was the only training given; 195 declared they gave personal sales training to their salesmen; 30 indicated that correspondence courses were used. Product sales training, the questionnaire revealed, was given by virtually all of the major manufacturers for their own equipment. This sales training included classes, meetings, correspondence courses, sales manuals, manufacturer and distributor showings of the product, and talks from distributors' salesmen.

To determine the interest of the dealer in a sales training program, another group of questions was asked. "Are you interested in a sales training program for your salesmen?" brought forth 275 yes responses and 38 noes. "Which do they need, product training, or fundamental sales training?" brought a vote of 187 for product training and 258 for fundamental sales training. As to whether dealers would be willing to pay a nominal amount per salesman for additional training, 143 said yes, and 102 said no.

To decide what type of sales training appeals to dealers, were more questions. To the question "Is a correspondence course worthwhile?", 69 answered in the affirmative and 186 said no; to the question, "Are inspirational sales talks of value?" was a large vote of 274 yes, and 22 said no. (These answers are not consistent with the previous answer as to the preference for fundamental sales training.) To the question, "Do you wish the utility to give further assistance to training salesmen on the utility's services, policies, rates, and cost of operating appliances?" there were 244 who asked for such assistance and 19 who said it was not needed.

Another question as to what could be done by utility, jobber or manufacturer to help train dealer salesmen to sell more appliances, brought forth a wide variety of suggestions, none of which were numerous enough to indicate a strong desire for a sales training program. The suggestions ranged through the entire gamut from "more contact with field men of the manufacturers and distributors" to requests for help in eliminating price cutting and other trade abuses. All kinds of sales helps were asked from the utilities and manufacturers.

### Available Sales Training

Two other phases of the committee's activity, carried on simultaneously, brought forth only the general conclusion that the available sales training is neither well known to dealers nor their salesmen nor is it particularly adaptable to appliance sales training. A questionnaire to the manufacturers and distributors as to the type of sales training provided by them revealed that virtually all of their training was of a product nature. Likewise it was highly specialized to the particular product of the manufacturer. Fundamental sales technique was incidental to the exploitation of the product in question.

Surveys of the available sales training from high schools, colleges, sales schools, sales counselors, etc., were of value to the particular companies making these surveys. The results of the dealer questionnaires also are of more vital immediate importance to the individual utility companies than is the general overall summary of the entire survey.

In discussing the results of its work, the committee reached certain conclusions which are based upon experience in the conduct of the survey and of observation.

New salesmen, it was felt, could well be furnished the industry through universities and colleges where sales training classes on an elective basis could be initiated, perhaps supplemented by product training. Such a program has since been initiated in Los Angeles by the Electrical Development League in cooperation with the City College.*

As to older salesmen, these conclusions were drawn: Inspirational speakers, giving sales training on an inspirational basis, are costly and the effect of their work is short lived. They have a hypodermic effect on sales for a short time which soon wears off.

Fundamental sales training, the most desirable, represents hard work on the part of the salesmen, and very few want "to go back to school" to learn. Older salesmen have a tendency to feel they know all there is to be known about selling, and to be "fed up" on sales training.

Correspondence courses are not generally favored because again they require hard work and considerable initiative on the part of the salesmen. A large proportion of those who start such courses never finish them, experience has proved.

One of the most promising methods of sales training for older salesmen is that of the conference method. It has its limitations, however. Only small groups of less than 20 can be handled successfully. Those in the group must be men of some experience since the conference is a means of pooling and bringing forth the combined experiences of each of the individuals attending. Such conference methods serve as an excellent review of the already known sales methods. In both northern and southern California conference classes have been conducted during the past year in conjunction with the state Department of Education.*

The impossibility of handling a sales training program on a broad scope to include all of the Pacific Coast Electrical Assn. member companies, was immediately apparent. No two companies have the same sales policy and this conflict, plus the conflict of the appliance campaigns, held at different times by member companies would render such sales training very difficult to handle.

If sales training for dealers' salesmen is to be carried on, the committee has recommended that it be done by each company individually to conform with its own particular sales program and policy. The survey conducted by the P.C.E.A. has given at least an indication of dealer feeling in the matter and revealed the serious lack of real sales training available to dealers under present conditions.

*Editor's Note: *Because of the vital interest in this problem, the sales training program for college students initiated in Los Angeles will be detailed in these columns in July; of the conference training classes in Northern California in August.*

# Who Pays the Reparations for Price Wars?

***He who buys below cost destroys his best future source of supply***

By E. F. Watkins

*The buyer who, in a time like this, scuttles the seller's ship for an immediate price advantage, may by that very act contribute toward destroying his own best source for future supply.*

*The seller who, in a time of flush business activity, over-reaches the bounds of legitimate price demand, is by that very act destroying the faith and confidence which may hold him the support of valuable customers during lean times.*

The principle involved has nothing to do with cant or sentimentality. It is neither a preachment nor a vague theory for moralists. There is nothing about the subject that suggests any "holier than thou" atmosphere. We need not raise the eyebrow, nudge our neighbor, or wink across the table at a suggestion which imposes upon each of us the obligation to deal in business fairly, justly, and with understanding consideration. It is just plain, good, sound business.

No one would want to entertain in his home a confirmed communist dynamiter whose sworn purpose was known to be one of ruthless destruction. Anyone with common sense would take steps to prevent such a situation by any means within his power. Still, we go along complacently accepting the confirmed business dynamiter within the bosom of our business family; we palliate his acts of destruction, wink at his breaches of business etiquette and playfully excuse them as "eccentricities".

These fellows, to all outward appearance, are busy enough, but they are busy to no permanent good. They are neither incapable of, or indifferent to, the need for analytical thinking. Proposed methods and practices which are best calculated to improve and build up an industry as such in order that each unit thereof may share proportionately in such betterments, do not appeal to them because it takes thinking to arrive at that viewpoint. They are too busy grasping at short-sighted expedients from day to day to understand this language. I am not so naive as to think that there is much to be accomplished by talking to such men, but if frequent reiteration and emphasis is worth anything, it may serve to encourage the branding of avarice, unbridled selfishness, and ignorance of sound business practice for the destructive influences they really are, and label the confirmed perpetrators once and for all so that they may not occupy that position of smug acceptance which is too often conceded them.

*It must be apparent to every business man, that to continue to sell on a basis which fails to cover a proper overhead burden, plus a reasonable profit, can lead only to disaster.*

This is all elementally true. You listen to speakers, even orate yourselves, write articles and adopt resolutions against profitless sellers and chiseling buyers, and then go right ahead yourselves gouging and chiseling with such vigor that there is hardly a man or an industry left untainted with some phase of this mania for self-destruction.

You know quite as well as I do that many of the current methods and practices are lowering standards of business conduct, extinguishing ethical considerations, and turning honorable business competition into a sanguinary, ruthless and vicious conflict. Libel, falsehood, piracy, deceit, even plain banditry are growing into the practices of every-day dealings to an extent that is little short of appalling. And the worst part of this situation, as I observe the tendency, is in the concurrent weakening of moral fiber which should impel men with purpose and determination to draw a dead-line in principle beyond which no temporizing or inducement of expediency will tempt them to step.

The word "sabotage" suggests to us circumstances and individuals hideous in the extreme, and outside the pale of any decent human relationships. We brand the bomb-throwers for what they are because of their overt acts; we recognize them as enemies of our social order; they offend our sense of right and threaten our very security and thus reduce their effectiveness for greater harm. I cannot see that the overt act of the bomb-thrower, the methods employed by the gangsters and racketeers, are any more lawless or destructive than some of the methods and practices which are being employed today in business and in politics by men who like to consider themselves decent citizens and are still accorded recognition as such—sometimes even by the victims who have suffered at their hands. We will learn to brand such as outcasts and thus reduce their effectiveness for harm only by developing a public opinion intolerant of unmoral and rascally behavior.

I am authorized to speak as the representative of organized purchasing, of the purchasing profession, and to express the deep concern we feel in witnessing drift toward chaos in the thinking processes of so many men.

Contrary to the statements of uninformed commentators, we have a vast amount of competent testimony to substantiate the fact that the purchasing profession as a class, under the leadership of an executive type of broad-visioned men, deplore the present conditions of trade and industry with a very clear understanding. We have plenty of occasion daily to cope with the wildest, most frantic situations that truly seem to verge on insanity. We might

**THIS article was written seven years ago. Many readers requested that we induce the author to re-write it in light of today's conditions. His answer was cryptic and to the point—"The arguments are as sound today as they were in 1932." All who read this—and everyone in the industry should read it—must agree that is a fact.**

expect rash things to happen with illy equipped shoe-string operators, forced into conversion of goods for cash to meet urgent obligations.

*But when large national concerns go panicky with the rest, throw all discretion to the winds, and offer merchandise at material and labor cost or less in order to make a sale, the situation has become amazing. We, as buyers, are generally helpless to cope with it. We can and do express disgust and disapproval and counsel against such foolishness, but in the end the competitive conditions of trade, the practice of bidding, the insistence of the bidders, usually force us into compliance with the system.*

The subject of price regulation, by whatever means may be employed to produce uniform quotations from all bidders on a given article, sends some of my confreres in the purchasing profession into convulsions. I cannot work up any convulsions on this score if the conditions of control in a given case are honestly justifiable and the price is fair. I am more likely to convulse at finding that somebody broke down along the line and gave an extra five to somebody "by mistake".

Price control and price regulation, however, contain within themselves complicated, far-reaching and dangerous elements which in the final analysis may produce results not possible to anticipate at the time of their formation. We may divide the subject of price regulation into two classes: that type existing under the control of government, and that type existing by the consent of a group but without governmental authority.

Governmental price control may be inspired by an effort to benefit basic production and industry, but it usually gets out of hand with bad results. We are now in a position to look back upon many instances of wreckage and catastrophe which are a sad commentary on realization of the hopes and good intentions out of which they grew.

The trend toward government in business raises a spectre which casts its shadow far and wide; it stifles the initiative of trade agencies; it dulls realization of our individual responsibilities; it weakens purpose to assume leadership, to overcome obstacles and clear the way for advance. As soon as we, as individuals, allow our judgment to become befogged, so forgetting fundamentals that we run to government to fix and regulate our affairs, we are departing from the only road which leads to achievement of American ideals; we are exchanging our birthright of independence in thought and character for a blighted mess repugnant to the American soul.

As to the type of price control represented by association agreements, manufacturers' resale price control, and so forth, there is much that can be said for and against such price regulation or whatever you may wish to call it.

Organized purchasing's contribution to basic sanity is being directed toward building up a strong bond of mutual interest, of friendly confidence in our relationships with the men we do business with. We take a live and active interest in their problems and their success just as we find they take in our problems and our success. This spirit of intelligent understanding is being cultivated and is growing in this nation of ours. We intend that it shall continue to grow until it extinguishes the traditional antagonisms which were assumed to exist as a natural barrier between buyer and seller.

*We can get no gratification out of any transaction with a worthy, capable, friendly supplier which will result in injury and loss to him. We are not always able to pull him out of the bog, but at least we are not going to push him in deeper. When we have risen to the capacity of vision to regard business in its broad relationships, we grow away from and lose patience with the petty practices and meanness which remain the stock in trade of many who are playing at business.*

John D. Rockefeller, Sr., is quoted as having made the following reply to a question as to how he managed to make so many decisions that turned out so wisely: "We never deceive ourselves;" and he repeated it, "We never deceive ourselves." It is a valuable suggestion; very potent of benefit for all of us. I am often conscious of wrong judgments, too hasty conclusions, and consequent error because I deceive myself through laziness or plain carelessness in accepting impressions without verifying facts.

I appeal most urgently to the stamina and character of every business man to assert himself in no uncertain terms. Call a spade a spade, and brand it as such, so that he who runs may read. We have had our fill of trick hypocrisy, business crooks, demagogic quackery, plain unvarnished lying and deceit, and a full measure of various brands of damn foolishness to muddle our brains and clog our way, and we have suffered it long enough.

I urge you to cease looking for a "Moses" to lead you out of your difficulties. I urge you to cease leaning on the weak reed of governmental agencies to solve your problems. Take matters in your own hands; know the facts; face them with courage and determination; clean house right down to the cellar and burn the rubbish.

*Do not deceive yourselves by temporizing with principles, but know your costs and base your prices on known costs, plus proper burden, plus reasonable and legitimate profit, and sell yourselves and your goods on honest worth, dependable service, and in a spirit of complete community of interest with the customer's welfare. I can assure you that the leaders in the purchasing profession today place these qualifications ahead of price in establishing permanent sources of supply. We are not happy over the confusion and irresponsibility which forces us now at times to place orders where they are not earned.*

Repeating Mr. Rockefeller again, "We never deceive ourselves." Let no one of us deceive himself by clinging to the idea that some time, somehow, if he can hang on long enough, he will manage to get back into the old stride in the old way and everything will be rosy again. Success for the future is going to come only to those who have the intelligence to analyze now the conditions and trends of the times, to develop the facts, then to face those facts fairly and squarely and with courage and energy map out a new course.

Our job is to clean house, reduce costs down below any levels we ever dreamed were possible. This can be done, has been done, and is being done, and the men who are doing it have sense enough to refuse to join the lunatics. They keep clear of sales which do not carry a profit in addition to burden. The management of such concerns will not tolerate any salesmen with the price complex.

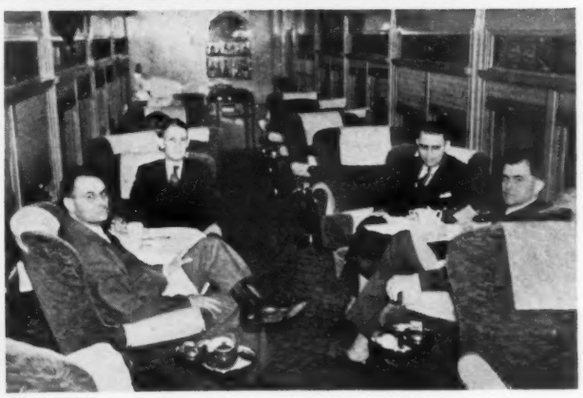
The responsibility for our present disorder rests to some extent on each one of us individually. We have not failed because of ignorance of economic law so much as because of utter disregard and defiance of sound principles. We have shut our eyes to the dictates of reason and common sense and let cupidity and greed dictate our policies. What we need is courage to face facts, character to stand by sound principles, a militant personal honor in our dealing, a keener sense of individual responsibility in our human relationships. The machinery for reconstruction will grow out of this.

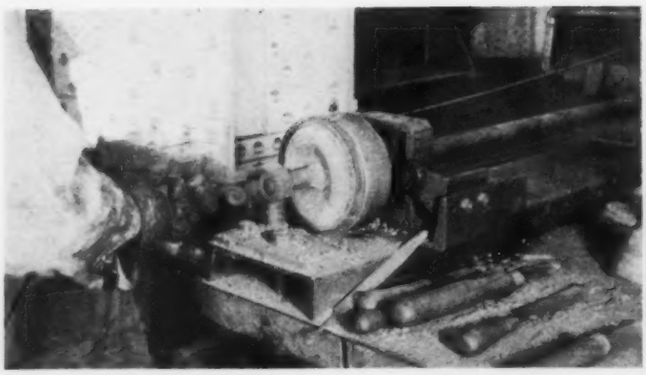
# Northwest Engineers Were Busy in Seattle

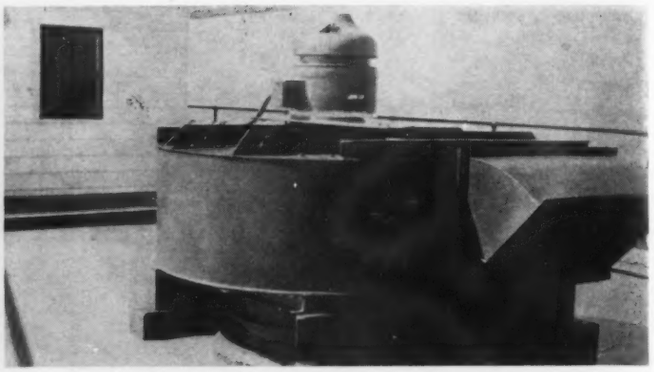
Northwest engineers were not oblivious to the sales aspects of their field when they met in Seattle, April 19-22. At right, LeRoy Grettum (left), Association president, and A. Vilstrup (right), Section chairman, talk over the engineering program as they stand before a sign borrowed from the commercial men. At far right are Paul Ashworth (left), vice-chairman, and A. W. Pride (right) of the Westinghouse company, Seattle

Below, registering, are (left to right) Harry Jones, Idaho Power; Grettum, and Charlie Cutter, Pacific Electric Mfg. Standing at table (left to right): H. N. Raymond, General Electric; F. E. Bodine, Westinghouse, and E. E. Walker, B. C. Electric. Left, Marion Werner of the Assn.

Streamlined pipes were plentiful. At right (L to R) are Cutter and pipe; C. H. George, Harry Sewall and pipe, and A. L. Pollard, all of Puget Sound. Below left: C. R. Wallis (left) of General Electric, and Joe Hellenthal (right), of Puget Sound, who was responsible for the excellent arrangements. Below, center J. B. Fisken (left), of Washington Water Power, was celebrating his 50th year with the industry. With him are two chief engineers: George Quinan (center) of Puget Sound, Walter Brenton, Portland G.E. Below right: Homebound and tea-drinking (L to R), Raymond, Glen Southward, Idaho Power; Bodine, and G. S. Cooley, Ebasco







# IDEAS
## yield new designs

BOILER CAPS (above left) which cover handholes are scraped clean of clinging gasket on a simple machine used by Southern California Edison at its Long Beach steam plant. It was designed to turn the elliptical cap so one edge rotates through a fixed position. It permits one man to clean 150 caps in a day, instead of 40

DIRECT MOUNTING (above right) of a blower was resorted to with economy by engineers of the Pacific Bridge Co. in ventilating a dredge. The blower intake fits directly over the 32-in. duct and is powered by a 7½-hp. irrigation motor

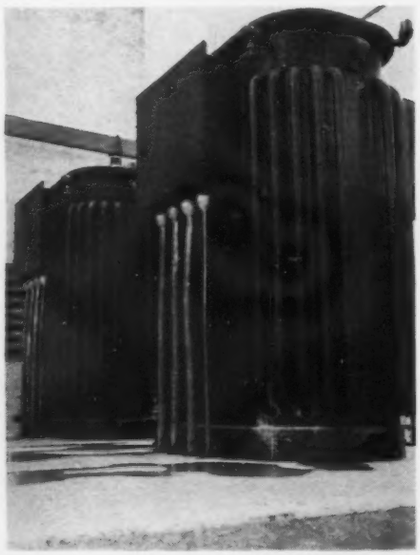
TRANSFORMER CABLES (left) are wiped directly to the 3-phase station transformers. The method was employed by PG&E engineers, and the same treatment is given to both 12-kv. primary and 240-120-volt secondary leads. Necessity for enclosing units or isolating terminals was eliminated

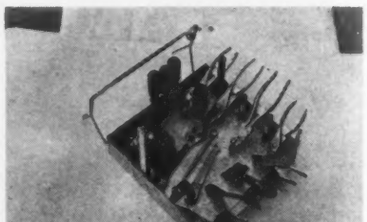
RUGGED BATTERY RACK (below left) was designed by PG&E engineers to resist earth movement, thus safeguarding power source for an important 125-volt control circuit

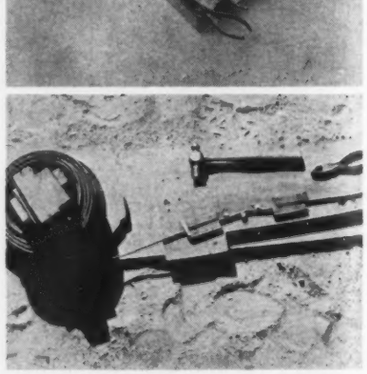
OVERHEAD GROUND WIRE (below center) is quickly transferred from sheave to tower in transmission line construction by means of this jack, designed by Stone & Webster Engineering Corp. It was used in building Southern Cal. Edison's Boulder line

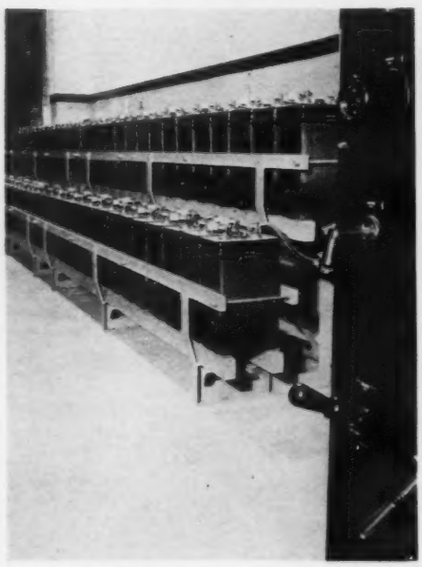
POLE PLATFORMS (below right) make for safety, convenience of workmen, and easy portability. The device, shown both collapsed and in position, was designed by engineers of L. A. Bureau of Power & Light

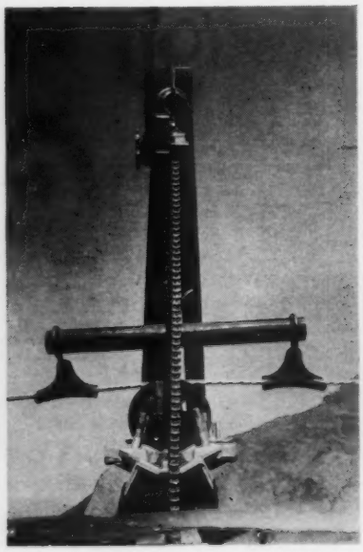
TOOL KIT (below) designed by A. W. Gay, of Nevada-California Electric Corp., has proved useful in switchboard wiring. Made up of sheet metal with removable handle, it provides a holder for each tool. Thus tools can be reached quickly. The simple arrangement of pay-off reel and guides is effective for straightening No. 12 slow-burning switchboard wire

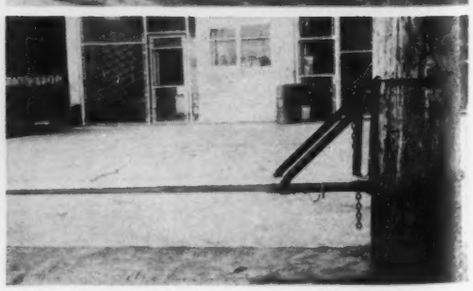








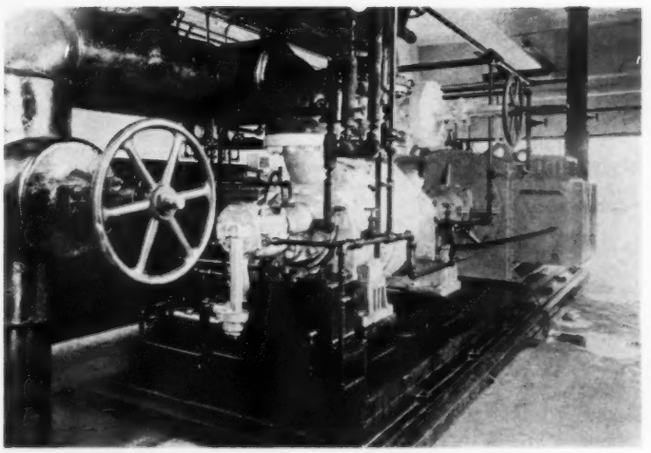




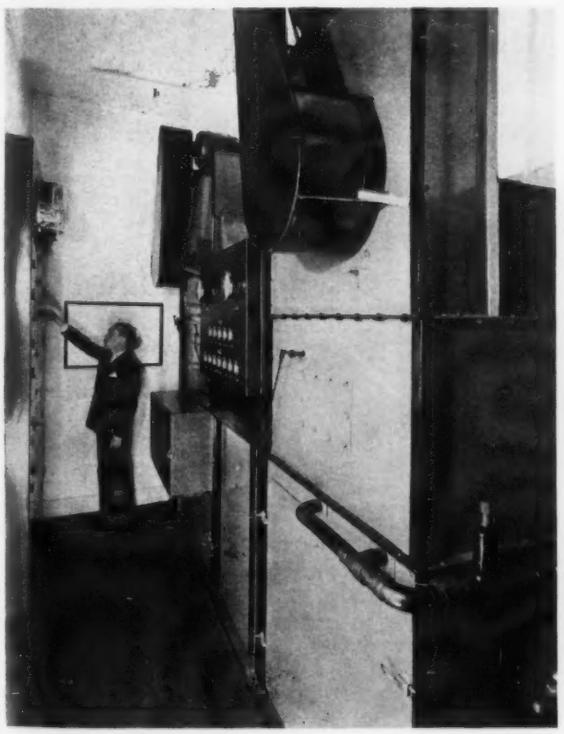
# BIG JOBS

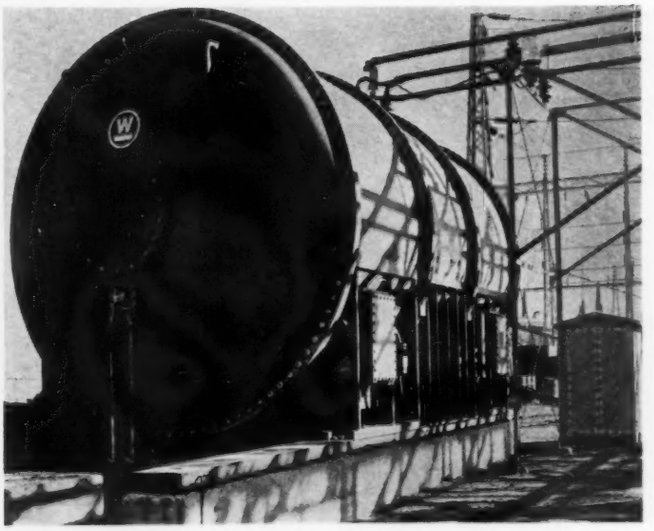
SINCLAIR-RICHFIELD Oil Corp. (right) has completed a refinery at Watson, Calif., which, in addition to being significantly modern in the eyes of petroleum men, is noteworthy for the new duties it has assigned to electricity. It is served by Southern California Edison Co., Ltd. It also represents the first application of large explosion-proof motors, one of which is pictured below. These were furnished by General Electric Co. The unit is totally enclosed, inert-gas-filled, squirrel-cage, induction-type, 1,000-hp., 3,000-r.p.m., and drives a hot-oil charging pump. It is filled with carbon dioxide gas under slight pressure. The gas serves as a heat exchanging medium. The pressure prevents explosive fumes from entering the motor

THE SYNCHRONOUS CONDENSER (below right) has been installed at Chino substation, terminus of Southern California Edison's new transmission line from Boulder, soon to be energized. Furnished by Westinghouse, it is rated 60,000 and 50,000 kva., on 60 and 50 cycles respectively (720 and 600 r.p.m.). It carries a new type of cooling system, in which only two coolers, arranged horizontally below each bearing, replace the usual four vertical coolers, improving accessibility, confining brush dust



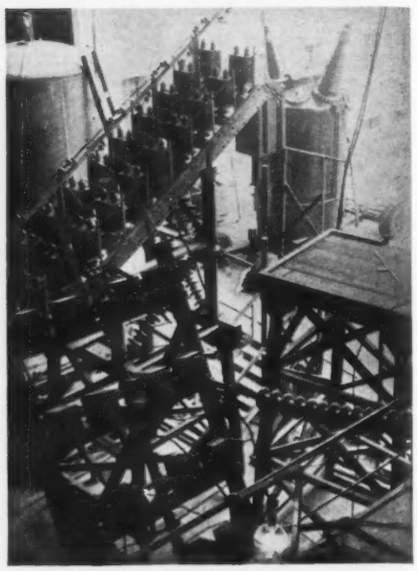
REVERSED REFRIGERATION (below left), as well as non-reversed, has been in service a year at Westinghouse' Emeryville, Calif., plant, has achieved a 5 to 1 heating ratio. The condenser section of the unit is seen in the foreground, the evaporator section in the background, and gage panel and thermostat at center



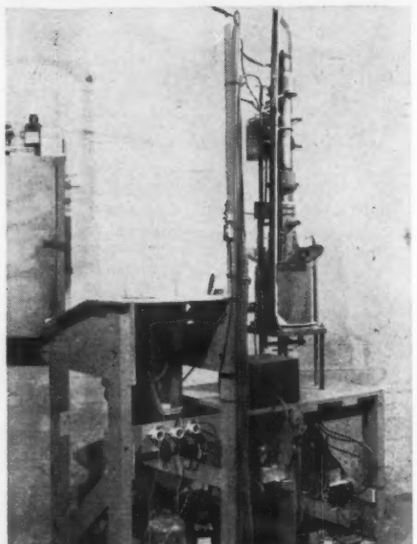


# MISC.

PASADENA'S Municipal Power Department (left) combined usefulness and beauty by building the new cooling tower adjacent to its steam plant in the form of a fountain, which is illuminated at night by 48 color combinations. Normal circulation is 500 gal. per min., emergency is 720 gal. per min.



TWO MILLION VOLTS (right) are available to California Institute of Technology through addition of a new unit to its surge generator. Each unit consists of twenty 50-kv., ½-mf. capacitors, arranged in a Marx circuit. When connected in series, the two units produce the higher voltage, being used here for surge tests on one pole of the 138-kv. breaker in the background. Below is the oscillograph used in conjunction with the generator.



PUGET SOUND POWER & Light Co. (left) employs 4-wire delta underground secondary with deltas connected through translators. One of these, rated 144-kva., 3-phase, 360-120-volts is being pointed out to J. H. Steede, of B. C. Electric Rwy., by Wallace Quistorff, of Puget Sound. At right James B. Spellar, Puget Sound

WAVES (below right) are reproduced in slow motion on device developed by Westinghouse

NIGHTMARE to a tree trimmer (below left) this strange piece of workmanship actually exists. It is in California

# Electric Shavers

## Riverside, Calif. Hardware Co. uses effective sales methods

Fifteen hundred electric shavers and only three or four complaints. That's the sales record of Westbrook Hardware & Furniture Co., Riverside, Calif.

At the very beginning, when shavers first came into the appliance picture, John R. Westbrook, president of the company, decided the only thing to do was dominate the field or not enter it at all. Accordingly, he has put in a large stock of all the tried-and-true shavers in the upper price brackets and has established a complete repair service.

In choosing the stock, Westbrook follows one rule which he has never broken: he takes a shaver home for a week's test. If it pleases him, he sends in an order; if not—and one or two have already been rejected—, he forgets the make. No shaver is ever guaranteed by the store.

In selling a shaver, the store never allows a customer to take one home for a try-out. Instead he is told that, since the make was stocked only after it had proved itself, the best thing he can do is step into a back room or behind the counter and try it then and there. "The only thing a customer need do," says Westbrook, "is learn how to use a shaver efficiently."

No shaver is allowed to go out of the store until the buyer has had careful instructions and practice in using it. Furthermore, if a woman buys a shaver for her husband, the store requires that the man come in for instruction. All of which is part of Westbrook's philosophy: "Any shaver going out without instructions means potential trouble for which there is no excuse."

Another thing which Westbrook demands is absolute truthfulness. The average customer says, "Will this shave me as well as a barber?" The Westbrook answer goes something like this:

"A barber is a trained specialist in one kind of work. He usually has been doing that one thing day in and day out for years. I would not like to make comparisons with the work of a specialist; but I can say that if you learn to manipulate this shaver correctly, it will give you a good shave and you can repeat that shave as many times in a day as you wish without getting a sore face. On the average, therefore, day in and day out, you can keep your face in a more perfect condition with an electric than with any other kind of razor. I shave with one myself and use nothing else."

Mechanical features are never brought into a sale. The work that the shaver will do is the point discussed. If a question is asked as to which is better, a motor or a vibrator, the answer given is that each has been found satisfactory.

Shavers in the Westbrook store are given good display space in a showcase immediately inside the front entrance. They are exhibited with other items which are suitable for gifts and which have a special atmosphere about them—fountain pens, reading glasses and costly silver pieces.

# Quick Review

## Important Sales events of the month and month to come

Crammed to the brim with convention papers and reports, a large number of which deal with valuable sales ideas and methods, space for current news of the Sales Parade is abbreviated in this issue. Passing in review in the past and present month were the following:

### Matchless

Sensational emphasis on the "matchless" character of electric ranges and cooking is being given in Los Angeles by advertising and cooking demonstrations of the Bureau of Power & Light. Ranges wrapped in cellophane cook entire meals, canaries are shown over the range whilst a meal is cooking in the oven, water is boiled, eggs fried, with paper between the range element and the pan to demonstrate that flame is unnecessary, and similarly the specific safety attributes of electric cooking are dramatized.

### Matchless House

A $5,000 "matchless home," fully equipped and furnished, attracted visitors to the electrical exhibits at the second annual Southern California Home Show, Los Angeles, May 12 at the Pan-Pacific auditorium. The Electrical Development League of Southern California sponsored the home, which included latest electrical appliances, adequate wiring and modern lighting. At the close of the show, the home will be moved to a Wilshire Boulevard lot owned by the Bureau of Power and Light, where it will be open for inspection for about a year.

Another attraction at the Home Show was the exhibit of a modern kitchen, service porch and bath as compared to similar rooms of the 1890 period. About 12,000 square ft. of display space will be utilized by the electrical industry at the Home Show.

### Spring Fair

San Diego's third annual Spring Fair of Modern Home Ideas closed its six-day run April 30 with what its exhibitors insist was the largest volume of immediate and potential business yet realied from such shows. Attendance reached 65,000, slightly less than a year ago, but exhibitors considered it a more productive show. Every exhibit space was signed far in advance, four latecomers failing to get admission. Decorative scheme, entertainment features, and handling of the crowds was better than at previous fairs and exhibitors got more for their investment, according to reports from J. Clark Chamberlain, manager, Bureau of Radio and Electrical Appliances of San Diego County, which sponsored the show.

### Spokane Dealer Contest

Second period of a three lap dealer salesmen's contest for range and water heater sales in the Inland Empire Electrical Equipment Assn. territory began May 8 and runs to July 11. Winners of the first period contest were Charles Wilks, Washington Electric Appliance Co., Spokane, with 11 ranges and 5 water heaters. C. L. McDuffy, of Sears Roebuck was second, A. M. Clinton, of Okanogan, third; R. O. Gladstone, Montgomery-Ward, fourth; and W. D. Simmonds of the same company, fifth. Winner of the entire three periods will receive a free trip to San Francisco Fair.

### Midsummer Market

Biggest appliance event in the San Francisco bay region in June is to be the annual mid-summer market at the Western Merchandise Mart, San Francisco, June 26 to July 1, more than a month earlier than usual. Of the six markets, the 10th Western Radio and Appliance Show and the Lamp and Giftwares Show are of interest to electrical dealers. On Wednesday evening, June 28, the radio and appliance trade dinner, a feature of the market week, will be held at the Mart Club on the 9th floor of the Mart.

Television receivers will be shown for the first time to the trade. First showings of new models in refrigerators, dishwashers, roasters, room coolers and electric ranges. Fluorescent desk and table lamps are promised in the lamp showings. Appliance show arrangements are in charge of George L'Amoreaux of the Mart.

BANK OF AMERICA's "Timeplan" form of financing sales of electrical appliances will be intensified on June 2, with the inauguration of an extensive promotional campaign aimed at electrical dealers and customers alike. The new program places at the disposal of dealers the facilities of the bank's 491 branches located throughout California, as well as an elaborate and carefully planned cooperative advertising and merchandising service. Already three utility companies have tied-in with the plan of financing and have drawn up schedules of "Timeplan" installment payments for distribution to their cooperating dealers. Southern California Edison Co., Nevada-California Electric Corp. and San Diego Consolidated Gas & Electric Co. have issued schedules. The plan also extends to gas appliances.

SAN FRANCISCO Electrical Contractors Assn., participated in the *Call-Bulletin's* "Now is the Time to Buy" advertising and promotional program on home building, which ran for 12 weeks with full page advertisements.

# Future Campaigns

## Advance News of Scheduled Sales Boosters by Western Utilities

During the next several months, the following dealer-utility campaigns will be presented:

Arvada (Colo.) Electric Co.—July, range campaigns.

Coast Counties Gas & Electric Co.—June, electric and roaster campaigns. Special events, demonstrations of company on sales floor, before farm center groups and range meetings.

Denver-dealer activities—June and July, adequate wiring, refrigerator and fluorescent lighting campaigns.

Idaho Power Co.—June and July electric ranges and water-heaters campaigns. Spring range campaign highly successful; total of 956 ranges sold against an 800-unit quota.

Inland Empire Electrical Equipment Assn.—Cooperative promotion plan began June 1, on electric ranges. The plan, in form of contest, will last for six weeks. (This is part of range and water heater campaign started by the association March 20.)

Mesilla Valley Electric Co., Las Cruces, N. M.—June, refrigerator campaign.

Mountain States Power Co., at Douglas, Wyo.—Cooperative promotions; at Casper, Wyo.—June and July, Roasters and air-cooler campaigns.

Nevada-California Electric Corp.—May, refrigerators, and June, July, electric range campaigns.

Pacific Gas and Electric Co.—May, electric range promotion built around customer education on low cost of electric cookery. "Guess Again" national theme will be supported by newspapers, billboards and bill stickers.

Portland General Electric Co.—June, water-heater campaign.

Public Service Co. of Colorado—June, refrigerators and IES lamp campaign.

Puget Sound Power and Light Co.—June, range, refrigerator and water-heater campaigns.

San Diego Bureau of Radio & Electrical Appliances—June, refrigerator campaign; July, electric ranges and water-heater campaigns.

Southern Colorado Power Co., at Rocky Ford and Pueblo—June and July, refrigerator, electric ranges and water-heater campaigns.

Utah Power & Light Co.—June, July, commercial cooking and water-heater campaigns, with traveling restaurant as special event in June.

Western Colorado Power Co.—June, hotplate and roaster campaigns.

Western Public Service Co., Laramie, Wyo., and Las Animas, Colo.—June, clock campaign; July roaster campaign.

## APPLIANCE SALES REPORT, 1939

**A Summary of Dealer and Utility Reports Compiled by Associations, Societies, Bureaus, or Dealer Contact Departments of Utilities**

| REPORTING COMPANIES | Idaho Power Co.[1] | | Northwestern Elec. Co.[2] | | Montana Power Co.[3] | | P. G. & E. Co.[4] | | San Diego Cons. G. & E. Corp.[5] | | San Joaquin Power[6] | | Southern Calif. Edison Co., Ltd.[7] | | Utah Power & Lt. Co.[8] | | Wash. Water Power Co. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current | 4 Mos. | Current | †Mo. | Current | †1 Mo. | Current | 3 Mos. | Current | 3 Mos. | Current | 4 Mos. | Current | 3 Mos. | Current | 3 Mos. | Current | 4 Mos. |
| Ranges | 417 | 1,055 | | | | | 297 | 831 | 42 | 89 | 124 | 448 | 212 | 493 | 225 | 641 | 235 | 610 |
| Water Heaters | 210 | 426 | | | | | 244 | 667 | 28 | 74 | 73 | 242 | 75 | 184 | 78 | 112 | 196 | 396 |
| Air Heaters, aux. | | | | | | | 248 | 1,760 | 84 | 604 | 11 | 112 | 72 | 816 | 44 | 277 | 26 | 325 |
| Air Heaters, 220 | | | | | | | 75 | 279 | | | 59 | 215 | | | | | | |
| Refrigerators | 629 | 1,268 | | | | | 3,788 | 8,381 | 519 | 1,201 | 829 | 1,550 | 2,764 | 6,001 | 428 | 1,372 | 1,073 | 2,153 |
| Dishwashers | 1 | 4 | | | | | 15 | 34 | | | 2 | 5 | | | 3 | 5 | | |
| Washers | 392 | 1,624 | | | | | 2,847 | 7,368 | 376 | 1,050 | 370 | 992 | 2,217 | 5,883 | 647 | 1,861 | 546 | 1,622 |
| Ironers | 20 | 158 | | | | | 421 | 1,277 | 57 | 142 | 59 | 138 | 258 | 735 | 36 | 160 | 34 | 117 |
| Vacuum Cleaners | 193 | 588 | | | | | 2,988 | 8,099 | 246 | 740 | 94 | 307 | 1,293 | 3,485 | 441 | 1,130 | 277 | 929 |
| Radios | 508 | 2,741 | | | | | 10,137 | 28,067 | 871 | 2,634 | 582 | 1,925 | 4,396 | 12,502 | 1,157 | 5,721 | 1,129 | 5,123 |
| Mixers | 71 | 232 | | | | | 295 | 861 | 84 | 200 | 34 | 101 | 196 | 793 | 48 | 472 | 100 | 450 |
| Cookers, Casseroles | 25 | 71 | | | | | | | 43 | 130 | 2 | 9 | 34 | 97 | 10 | 40 | 244 | 667 |
| Irons | 471 | 1,645 | | | | | | | 377 | 1,056 | 231 | 854 | 975 | 3,066 | 599 | 2,566 | 517 | 2,143 |
| Waffle Irons | 112 | 459 | | | | | | | 161 | 362 | 62 | 317 | 294 | 1,032 | 195 | 1,179 | 133 | 553 |
| Toasters | 217 | 798 | | | | | | | 282 | 739 | 108 | 469 | 403 | 1,418 | 205 | 1,163 | 348 | 1,355 |
| Table Stoves | 208 | 591 | | | | | | | 51 | 181 | 23 | 97 | 162 | 609 | 129 | 425 | | |
| Heating Pads | 65 | 364 | | | | | | | 115 | 535 | 19 | 187 | 155 | 750 | 132 | 591 | 76 | 395 |
| Curling Irons | | | | | | | | | | | | | 53 | 139 | 107 | 295 | | |
| Coffee Makers | 205 | 731 | | | | | | | 309 | 772 | 104 | 520 | 260 | 722 | 97 | 523 | 366 | 1,393 |
| Sewing Machines | | | | | | | 569 | 1,467 | 137 | 311 | 29 | 42 | | | 143 | 490 | 99 | 315 |
| Clocks | 119 | 511 | | | | | | | 310 | 851 | 111 | 550 | 441 | 1,408 | 175 | 894 | 244 | 827 |
| Fans | 17 | 49 | | | | | | | | | 36 | 45 | 20 | 46 | 13 | 30 | 43 | 115 |
| Floor Polishers | | | | | | | | | | | | | | | | | | |
| Sun Lamps | 16 | 104 | | | | | | | | | | | 31 | 150 | 11 | 28 | 15 | 51 |
| Reflector Lamps | 363 | 1,468 | | | | | | | | | 136 | 591 | | | 647 | 2,327 | 547 | 4,529 |
| Misc. Lamps | 546 | 2,103 | | | | | | | | | | | | | | | 785 | 3,106 |
| Misc. Small Appl. | | | | | | | | | 576 | 1,758 | 26 | 351 | | | | | | |
| Yard Lights | | | | | | | | | | | 83 | 200 | | | 20 | 132 | | |
| Shavers | | | | | | | | | | | | | 219 | 701 | | | | |

**SOURCES**

[1] Figures compiled by Electric Equipment Sales Association. Include power company sales of all reporting dealers.

[2] Lists appliances sold by dealers in Portland area. Figures compiled by Northwestern Electric Company.

[3] Combined dealer and company sales from report of Montana Power Co.

[4] P. G. & E. reports sales of major appliances only based on accurate reports from dealers' accounts. Ranges, water heaters and air heaters include company and dealer sales. * Due to delays in compiling report current and total figures are always one month behind those figures of companies reported in other columns of this table.

[5] Gathered by Bureau of Radio and Electric Appliances of San Diego County. Estimated monthly sales figures used in this table: Miscellaneous figures includes fans, curling irons and sun lamps.

[6] Compiled from dealer reports by Merchandising Division of San Joaquin Power.

[7] Includes reports from dealers on San Joaquin Valley system of company as well as Southern California areas served.

[8] Includes Utah Power & Light Company territory in Utah, Idaho and Wyoming. Also Western Colorado Power Company territory.

† April figures were not available at time of going to press.

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No. 6-c JUNE 1939

# Electrical West Sales Guide

**To any dealer** electric mixers should make cash register music. With a little effort to learn and use a sales story and simple demonstration, mixers sell fast, provide quick turnover, fill in the off-seasons with profitable business, make repeat customers for the gadgets (attachments), create store traffic, give the salesmen an item with which to fill in odd times and seasons and thus help keep good salesmen on the staff, doing a profitable business. Dealers who also sell ranges and refrigerators can combine mixers on a range or refigerator financing contract and increase their volume.

## Mix Yourself Up Some Profit—

Ingredients for a stimulating concoction of mixer sales are simple and effective if used regularly and with vim. A simple demonstration plus a sprinkling of the sales the sales points (inside), well mixed until the two are smooth, and you are ready to close with an order for delivery.

**To any salesman** the sale of mixers should spell security, a chance to tide over the seasons between the major appliances. They sell easily with a simple demonstration. They bring repeat business from customers who need the added labor saving attachments. What an item a mixer is for call-backs on range or refrigerator customers, either to sell them the mixer or to obtain names of prospects from users. Mixers make a fine **combination sale** with a range or refrigerator, financed on the same contract at very little extra payment. A bigger order—more commission or a better rating.

## What Electric mixers mean to you

## What to Say

# "A Mixer Will Save Your Hands"

Women have become careful of their hands along with the more general attention paid to style and beauty. Kitchen tasks play hob with the hands. Well kept finger nails are impossible with a lot of paring, shredding, shelling and vegetable and fruit handling. Creamy cakes and batters require beating and stirring that tire the arms. Appearance of vegetables when served means more in these days of entertaining and social graces. Factory prepared salad dressings and relishes are more costly than homemade. These are your allies in selling electric kitchen mixers. By talking in terms of such self-interests of the customer and keeping the mechanical features in second place (as proof of the ability to deliver a service), you will close more of your sales. When you talk mechanics you scare some women. They are afraid of machinery, even of electricity often. But the idea of saving their hands, their arms and shoulders from tiresome beating, of serving attractive looking and tasting dishes, does not give them an opportunity to worry about the machinery. Why should they?

•

Serving you as a reminder, a check chart of the advantages of owning and using an electric mixer, the sales points you can use most effectively to convince and to close sales, are listed on the opposite page. Refresh your memory by reading them. Work them into your sales presentation as you make a demonstration. Use them often.

STAMP OF APPROVAL

*Recommended by Your*

**THE MONTANA POWER CO. • UTAH POWER & LIGHT CO.**
**IDAHO POWER CO. • CALIFORNIA OREGON POWER CO.**

### Saves your hands and arms

Keeps your hands freer of fruit stains, cuts, scraping. Saves you from beating and stirring, that tires you. Does easily even the hard stirring of candy and cookie batter; the tedious beating of mayonnaise.

### Saves time in meal preparation

No trick at all to mix up a cake or biscuits, or prepare vegetables for a hurried meal.

### Repeat your success

Every cake can be successful with the same measured quantities and smooth mixture.

### Save money on prepared foods

Mayonnaise and salad dressings, spiced to your own taste, can be made at a saving. Cookies and cakes too. Soup stocks from meat and vegetable trimmings save the household budget money.

### Much more sanitary

Food is touched less by hands, even as in the most sanitary modern factories.

### Improves the appearance of foods

Vegetables precisely sliced or shredded cook more quickly and are more attractive when served. For waterless low-temperature cooking this assures tenderness and satisfactory cooking while preserving fresh color and vitamins.

### Get along without servants

With such up-to-date time and effort saving equipment in a modern kitchen, servants with their troubles are less necessary. The mixer requires no day off; it is always ready.

### Makes your kitchen modern

Attractive electrical kitchen equipment is the sign of modernity. You can take pride in it.

### So easy to keep clean

Less trouble to clean up after use than the old fashioned hand tools—beaters, shredders, etc.—that they replace.

### Such a versatile helper

With a variety of uses an electric mixer and its attachments does tiresome tasks that fingers and arms had to do before. It will beat, mix, or stir liquids and batters. It will cream butter and sugar, mash potatoes, grind meat and dry bread or nuts. It whips icings and egg whites, stirs stiff cookie and candy mixtures. It will slice, shred, peel, shell, rice, or puree and strain vegetables and fruits. It will grind and polish knives, buff silver, open cans, chop ice, grind coffee, extract fruit juices and turn the ice cream freezer.

As a close, offer to deliver the mixer and set it up conveniently so that it will be always ready to do its work without bother or preparation.

to

all former

range customers

Sell

Electric Mixers

Sales Allies —

PUGET SOUND POWER & LIGHT CO.

PORTLAND GENERAL ELECTRIC CO.

WASHINGTON WATER POWER CO.

# What to do—

## Display

Get the most out of your displays. Tell the public what your mixer will do for them—they may not know. Or they may have forgotten. A window full of gadgets may not mean a thing to a woman, but if cards are used to tell what each device will do it should cause her to want the mixer for the **services it will perform,** the tired arms and roughened fingers it will save, the economies it will make possible. Remember that the mail order catalog is that kind of a show window and it tells in a few words what the pictured appliance will do. Make your window and store display a real live "mail order catalog" that invites people to act now. What price a pretty window display if it does not sell for you?

## Demonstrate

For everyday, quick and easy store demonstrations that can be prepared inexpensively—soap powder mixed with hot water, not too much water, works up into a creamy lather. A drop of fruit coloring makes a contrasting color to the colored bowls. Lasts throughout the day. Or a pound or two of Crisco or other shortening—it will last several days. Use an oiled silk mixer cover to keep dust out after each demonstration. Cup the hand over the juicer to show how it works. Fruit makes a mess that requires cleaning after each showing. Select one attachment such as pea sheller which demonstrates easily and explain operation of the rest. A few peas will suffice and peas keep several days.

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# COMMITTEE REPORTS

## Northwest Electric Light and Power Association
## 1938-39

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# Business Development Section*

## Introductory Statement

THE section was organized and its activities outlined for the year 1938-39 at a meeting of the Advisory Executive Council, Seattle, Sept. 10, 1938. Bureau vice chairmen were selected and arrangements were made to secure committee members through nominations made by member companies. Another Commercial Cooking Conference was authorized, and the place of the annual meeting was set at Portland on the invitation of George Wisting and A. C. McMicken.

The fourth annual Commercial Cooking Conference was held in the auditorium of Washington Water Power Co., Spokane, Nov. 17-19, 1938, under the chairmanship of C. T. Bakeman, the chairman of the commercial and industrial sales bureau. There were present 60 delegates from 10 member utility companies and 17 representing ten manufacturers, jobbers, advertising agencies and the association office. This totaled 79 delegates, or eight more than last year. Discussions were heard during five half-day sessions while on Saturday afternoon a number of the delegates visited the Grand Coulee project. A mimeographed report of the meeting was subsequently distributed. Again a $2 registration fee was charged to defray the incidental cost of the meeting and the production and distribution of the minutes.

At this conference, plans were perfected to inaugurate the association's service to commercial and industrial heating salesmen, consisting of the issuance of a series of commercial and industrial utilization data sheets. The basis on which this service was to be offered, and the prize contest for those turning in acceptable data sheets were outlined. Subsequently, the first data sheets in the 1939 series, Bulletins No. 1 and 2, were issued to subscribers early in March.

The 14th annual meeting of the section was held at the Benson Hotel, Portland, March 16-18, 1939. General sessions were held under the chairmanship of W. A. Huckins, Thursday morning, Friday afternoon and Saturday morning. On Thursday afternoon and Friday morning the meeting broke up into five committee conferences as has been the procedure in the past few years.

At the opening general session, delegates were welcomed to Portland by Lester E. Humphries, assistant to Mayor Joseph K. Carson, Jr. Mr. Humphries stated that people of today take the

HUCKINS SNOW

value of electricity for granted without thinking of the tremendous investments and work that have gone into making this service so commonplace. Municipal ventures into the power business that have proved a success are the ones more frequently appearing in the news. We do not hear of the many that have proved failures, he said. In Portland there is no complaint. The private companies are doing a good job and the people believe they are capable of giving good service at a relatively low rate.

Following Humphries, Franklin T. Griffith, president, Portland General Electric Co., welcomed the delegates on behalf of the electrical industry of Portland, and LeRoy A. Grettum, president of the association, responded.

George H. Wisting, chairman of the committee on arrangements, then announced the entertainment features scheduled for Saturday afternoon, and introduced Horace Mecklem, Portland business man connected with Timberline Lodge, who invited the delegates to visit this mountain resort on the slopes of Mt. Hood. V. W. Hartley, managing director of the Pacific Coast Electrical Assn., was given the floor for the purpose of inviting Northwest Electric Light & Power Assn. members to attend the annual convention of his organization at Pasadena. The theme of this convention was to be the part played by the electrical industry in the industrial development of the 11 western states, and the California association was seeking a representative of the Northwest to cover this subject for the Northwest states.

The session closed with an executive round-table symposium on the subject, "The part of the sales department in the electrical development of the future," participated in by Kinsey M. Robinson, president, Washington Water Power Co.; L. T. Merwin, president, Northwestern Electric Co.; J. A. Hale, vice-president, Utah Power & Light Co., and C. J. Strike, president, Idaho Power Co.

On Thursday afternoon and Friday morning, the meeting broke up into five committee conferences running concurrently as follows: Two meetings under the residential sales bureau, George W. Madison, chairman, namely, (1) home modernization committee, J. F. McAllister, chairman, and (2) home service committee, Ralph E. Gale, chairman; (3) commercial and industrial sales bureau, C. T. Bakeman, chairman; (4) rural sales bureau, Earl A. Olson, chairman; and (5) advertising committee, Gilbert L. Stanton, chairman.

Again gathering in general session Friday afternoon, the meeting heard reports from the two committees of the residential sales bureau by F. J. McAllister and Ralph E. Gale between which was sandwiched an amusing one-man skit on water heating, entitled "Water, Water Everywhere and Not a Drop to Drink" by William A. Cyr, associate editor of ELECTRICAL WEST. There followed a talk entitled "Dealer Utility Sales Development Creates Better Business and Better Customer Relations" by Earl R. Woolley, Ebasco Service, Inc., New York. Extracts from this talk are printed in the fore part of the following proceedings. Cyr then showed several color slides of the lighting at the San Francisco Fair. Gilbert L. Stanton reported for the advertising committee, and the afternoon session closed with a talk, "Selling Adequate Wiring for Better Service," by Henry J. Morton, Association of Edison Illuminating Companies, Detroit.

At the Saturday morning general session reports of the findings of the commercial and industrial sales bureau were heard from C. T. Bakeman, A. H.

* Advisory Executive Council: W. A. Huckins, Utah Power & Light Co., Chairman; C. Patrick Johnson, Puget Sound Power & Light Co., Vice Chairman; Chairman, Commercial and Industrial Sales Bureau, C. T. Bakeman, Puget Sound Power & Light Co.; Chairman, Residential Sales Bureau, George W. Madison, Portland General Electric Co.; Chairman, Rural Sales Bureau, Earl A. Olson, Idaho Power Co.; B. C. Electric Railway Co.: W. C. Mainwaring; California Oregon Power Co.: Glenn L. Jackson; Eastern Oregon Light & Power Co.: LeRoy A. Grettum; Grays Harbor Railway & Light Co.: H. G. Kelsey; Idaho Power Co.: Ralph E. Gale; Montana Power Co.: I. L. Comstock; Northwestern Electric Co.: George H. Wisting; Pacific Power & Light Co.: D. B. Leonard; Portland General Electric Co.: A. C. McMicken; The Washington Water Power Co.: Lewis A. Lewis; Edison General Electric Appliance Co.: J. C. Platt.

Wegner, M. G. Kennedy, O. C. Mayer and A. H. Greisser. A sound-slide film illustrating 33 plus advantages of using central station power in commerce and industry, made by the West Penn Power Co. was shown as a part of this presentation. This report was followed by a paper on the "Fundamentals of Rate Making" by S. P. MacFadden, Puget Sound Power & Light Co., read in his absence by C. Patrick Johnson. Earl Olson then reported for the rural Sales Bureau, introducing as a part of his report F. Earl Price, of Oregon State College, who talked on "Research in Rural Electrification."

The meeting closed with two addresses of an inspirational character, the first by Ashton B. Collins, Birmingham, Ala., on the subject "Simplify Your Story," and the second by C. J. Strike, "Now Let's Go to Work."

In the following pages, after the printing of the various talks of a general character presented at the general sessions, there are extracts from the papers and discussions heard in the bureau and committee conferences, as well as the reports of the chairmen which were presented at the general sessions.

On Saturday afternoon about 25 delegates took a bus trip to Timberline Lodge where they had dinner, returning in time to catch the evening trains out of Portland. On the same afternoon another group was transported by private automobile to the Bonneville project on the Columbia River.

# Address of Welcome

## Cooperation with Federal Power Development*

By FRANKLIN T. GRIFFITH
Portland General Electric Co.

THIS geographic section of the country is one to be pointed to with pride. The vitality of our pioneers has left us a heritage that never allows us to be satisfied with things as they are. We have continued to endeavor to make the lives of our people richer and more satisfactory. This has been true particularly in those of us devoted to public service in the electrical industry. We have continued to improve service and to lower rates until today we are conceded as having the lowest average rates of any comparable area in the U. S. and a quality of service equal to any other section. This is a good policy, and we should follow it as long as we do not violate the elastic limit.

The threat of government competition has served rather to retard our development along these lines than to stimulate it. We are on the firing line of a great national experiment, and this experiment is a reality and not just a prospect about which the government is theorizing. Bonneville is here and within a few years appropriations from Congress will have provided for four new units in addition to the two now installed. The federal government likewise is continuing with the construction of Grand Coulee, and about the time Bonneville's increased capacity becomes available, there will be a tremendous installation of generating capacity at Grand Coulee. This is a fact, not fancy. Further, the Supreme Court has upheld the government in its program of developing power at these dams as an adjunct to the other services, navigation and irrigation, those projects are to supply.

GRIFFITH

We must assume that the government will not let these great developments lie idle. They must find a place where this power can be used in order to return a part of this investment. It is folly for us to say that the government cannot or will not compete with us. When we do that we simply lull ourselves into a false sense of security. Further, we cannot fight the treasury of the U. S. and expect to win. Therefore, it is up to us to see that the efforts to sell power from these developments are well directed. We must join in solving the problem of finding a load for these capacities instead of trying to fight them and putting ourselves in the way of a juggernaut. We should never stop trying to cooperate with the U. S. government in this enterprise.

Can't we convince the authorities that the load they seek can be obtained more efficiently through existing facilities than through the formation of competing agencies? Basically we can't expect to convince the government of this unless we are prepared to pass on to our consumers whatever real tangible benefits are derived.

Why is government power cheaper than ours? The U. S. is not paying less for materials or wages. But many of the costs we pay are not borne by the government. The chief costs in hydro-electric development are, as you know, interest on investment and taxes. As to interest, the government borrows money cheaper than can we as private corporations, and further, they pay interest on only a small portion of the total cost of the development—that part allocated to power. Further, they pay no taxes whatever. If, for instance, it were my company that had built Bonneville, the taxes we would pay on it would approximate $2,000,000 per year, a sizeable item wholly eliminated from the federal government's accounting for the cost of Bonneville power.

If we can arrange with the federal government to take some of that power and establish the theory that this is the way to carry the power to the people and still retain the tax revenue for their benefit, then we shall survive and fulfill the purposes for which we were incorporated to do business. We should not be fearful of meeting difficulties of this kind. The people have certain rights vested in Bonneville power. If we become distributors of this power, we should be prepared to conserve for the consumers whatever benefits accrue.

* An abstract.

# Response to Address of Welcome

## Importance of Salesmen*

By LEROY A. GRETTUM
Eastern Oregon Light & Power Co.

THE theme of this conference is "Power to Sell," and it is a happy thought that this point is emphasized because of the importance of increasing and extending the benefits of our service both to meet our increasing taxes and other costs and to dispose of the new blocks of energy to be brought in referred to by Mr. Griffith.

GRETTUM

Having come into the industry through the engineering end of the business, I am able from a somewhat detached standpoint to pay tribute to the salesmen. We engineers have been known to kid the salesmen and jokingly to disparage their efforts, but down in our hearts we appreciate fully the work they do in developing and improving our business and expanding our service. I never cease admiring the sales-

* An abstract.

man's ability to meet rebuffs and complaints of customers and still retain an optimistic buoyant spirit with which to approach the next prospect.

Some people seem to think that no effort is required to sell power, that all you have to do is build a power plant and some lines and the power sells itself. We in the business know the fallacy of this idea. We know how much earnest and intelligent effort has been put into the promotion of electric uses and into the sale of electrical appliances through which our services are made useful to the public, to arrive at the fine record of high consumption and low rates obtaining in this territory.

I also want to include in this tribute the representatives of the manufacturers and jobbers, whose cooperation and help in our selling problems have been vital factors in whatever achievements we can record.

**Part Played by Sales Department in Electrical Development of Future — Executive Comments**

## Pioneering Just Begun*

By K. M. ROBINSON
The Washington Water Power Co.

MUCH has been said of customer relations and public relations. This is the most "talked about" part of our business. Some have said that reasonable rates and good service would solve all our problems. This is not altogether true. Of these two factors, good service is the more important. As to rates, we must remember that we are trustees for millions of dollars of investment and that rates can't be too low or we will find ourselves unable to give the quality of service that is demanded in these days. Rates and service can't have been the solution because we have low rates and excellent service in the Northwest now.

ROBINSON

I am wondering if our pioneering hasn't just begun, if we are to be responsible for absorbing all these additional millions of kilowatt-hours to be generated by the new federal plants. We must remember that it is not our companies who will decide how this government power is to be disposed of. In the last analysis, the people will make this decision for us.

* An abstract.

If it is just a case of saving the people a little money, then other parts of the family budget are far more important, and other businesses could be socialized and subsidized with a greater possibility of profit to the people.

We must show through our sales organizations that we can do this job of selling these added millions of kw.-hr. better than government agencies can do it. If we can't prove a better capacity to do this job than the government, then I'm sure the people won't continue to leave the responsibility for this job in our hands.

## Salesmanship Is a Profession*

By J. A. HALE
Utah Power & Light Co.

SINCE coming into closer contact with sales work from the engineering end of the business, I have come to a more sincere respect for the profession of salesmanship. Salesmanship deserves to be classed with the other great professions though it is the newest of them. Medicine, you know, is the science of humans as things; engineering is the science of things; law is the science of humans. Salesmanship is the science of things in respect to humans.

From a somewhat unsavory beginning in the days when there was so much fakery surrounding the selling of patent medicines and other commodities, salesmanship has developed into a highly scientific, thoroughly reputable and extremely important profession.

HALE

The power business once had the glamour of technical novelty. Then the problem was to sell the demand, which was no real job of selling at all. It partook more of order taking, but we have come to realize that to develop the business to its maximum efficiency both from the standpoint of benefits to the public and to the company, it is necessary to apply salesmanship in its most intelligent form. You salesmen have become the spearhead of the battle between the several philosophies of government, and if we are to make our philosophy prevail, the salesmen will be the ones largely responsible for the victory.

* An abstract

## Future Development Depends on Today's Selling*

By L. T. MERWIN
Northwestern Electric Co.

IN examining the subject assigned to me, "The Part of the Sales Department in Electrical Development of the Future," it strikes me that the future will depend upon how we have done our selling in the past and how we are doing it right now. we should never forget that electric service should be sold on the basis that it will yield a profit or a benefit to the customer. If we have given our customers sound advice, if we have sold them adequately without underselling or overselling, if we have told them the truth and if the results they have achieved from the use of our service have been satisfactory, then we are on a sound basis. The future of your company will depend on the kind of advice you give your customer now.

MERWIN

The executives, the operators in steam plants and substations, the linemen, the meter testers and all of us in the business are just as much salesmen as the people of the sales departments.

An excellent way to find out what your customers are thinking about in connection with electric service is from a customer survey such as our company has been carrying on recently. Some of the replies have been illuminating to say the least, and it would pay any executive to take a little time to look at some of these replies. Such a survey can be used in setting up sales plans and contact work more intelligently and effectively.

* An abstract.

# Yes, it Is a Selling Job*

By C. J. STRIKE
Idaho Power Co.

IT seems to me that the American people are confused on the electric light and power issue and do not have a full appreciation of the fact that the present book value of electric systems represents the historical cost of constructing those systems over a period of years as public demand required.

The present government power program designed to construct a power system in 1939 on the chassis of the business built by private power companies over a period of years is not an emblem of supremacy. If we could be accused of one general criticism, it would be that we have failed to keep our customers informed on the fundamentals involved in the present light and power controversy.

Our position is no different than that of any other business on Main Street, and when such a comparison is drawn I have no fear but that the public will stay by those who have pioneered this industry.

It seems to me that this subject is appropriate for discussion at a sales conference for in the final analysis it is a selling job. If I could suggest one thing, it would be that every member of a sales organization be equipped with a story of the accomplishments of the industry over its half century of existence. It seems to me that our load-building program will be enhanced in value if through such a selling program we can clear up in the public's mind the fact that our industry has accomplished an acceptable job and is entitled to the same consideration as every other business on Main Street.

# Better Business and Customer Relations

By E. R. WOOLLEY
Ebasco Services, Inc.

IT IS becoming increasingly apparent that an enormous market for appliances and utilization equipment, as well as for the use of all utility electric service, exists in every territory. Maximum sales results from this market can be realized only through coordinated selling by utilities, manufacturers, distributors, dealers and all other interested agencies.

In other words a mass market requires mass selling. Dealer-utility sales development opportunities exist not only in the residential market. It includes residential, commercial, industrial, government, municipal and farm markets. Such broad and vast markets, comprising as they do such a multiplicity of customers and services, can be penetrated only by coordinated selling with utilities, the spearhead of the attack. To cover this enormous market it is estimated the electric utilities have about one salesman in the field to 15 salesmen of electric dealers.

If we can bring the dealers and other allies into our selling program we can make more contacts, build greater sales volume faster and thus build the community faster. If we can help build up a dealer we have increased business. This helps everyone in the community.

WOOLLEY

Let us look for a moment at the evolution of dealer-utility sales development. In the earlier stage, it was restricted to the residential market only, and essentially characterized by "co-operation" designed to keep the dealer happy. But today the scene has changed to true dealer sales development, building up a profitable business for the dealer and better living for the home. This change has been the growth of many years and has resulted from *building on sound experience.*

Back in 1900 to 1915 we had the pioneering era when there were practically no dealers and when utilities had not only to build their own businesses and run them but, in some cases, manufacture the appliances and equipment necessary to utilize their service.

Then we come into the period 1915 to 1932, when, to a certain extent, customer acceptance had been created and we find a profitable market for the sale of electric appliances, the competing stage. In this era I might point out that both the utility and dealers, often with horseshoes in their gloves, hit below the belt through the medium of unsound financing practices and a host of other items that were of common everyday occurrence. Utility salesmen, paid on a commission basis and depending, therefore, for their livelihood on sales of their own merchandise, certainly never let an appliance go to a dealer except over their dead bodies.

Then comes the coordinating stage from 1932 to 1939, and therefore where the dealer and the utility, instead of attacking one another, fighting each other as they had been, went shoulder to shoulder, creating new markets, increasing sales and profits. We find that the utility gains through having more people selling utility service, through increased public appreciation of the value of its service and more energy sales. Also the sales ally gains through fair competition, wider acceptance of products and more profits. And, of vital importance, the only foundation upon which rests all success in selling, the *customer* gains through better living, better business, earlier opportunity to learn of products, reliable sources of these products and services.

We are all aware of the need of an improved public attitude toward the utility industry and, as a matter of fact, toward all private industry. Also we are all too well aware of the need of building business at a profit, creating productive jobs, thus decreasing unemployment. We are increasingly recognizing the importance of selling in the successful attainment of these objectives. It has been said that selling is the keystone of the revenue building arch in every industry and without selling there can be no success.

### Good Customer Relations Earned

Better customer relations come with and are an important by-product of dealer-utility sales development. We have good customer relations when the largest percentage of customers have an appreciation and understanding of the value of the service rendered—faith in the integrity and honesty of the company rendering the service—and a belief that the price paid for that service is a fair one. Good customer relations do not happen—they are earned, they flow from performance not words. They are an important by-product of sound selling through which a customer appreciates the service or product he has purchased, uses more of it and pays for it ungrudgingly.

There are four bases of good customer relations: (1) You must have a product or service that fulfills an *essential* need. You have such a service. (2) Your product or service must be delivered *adequately* to your customer. It is adequate, reliable, dependable and flexible. (3) Your product or service must be *priced* to encourage greater use. It is. (4) Your product or service must be produced, distributed and delivered by a group of well trained, loyal, courteous human beings—you, who are the company in the eyes of your customer.

If these four fundamentals be fulfilled in their entirety, your service will

* An abstract.

be appreciated by your customers, it will be purchased in increasing amounts and it will be paid for ungrudgingly.

In connection with dealer-utility sales development as a builder of profitable business, I submit that every one of your customers is a prospect for one or more of your valuable services.

Also I submit that in union (cooperation) there is strength; *and electric service potentials are far from saturated.*

In the first place, *only 1.5% of your customer's dollar is paid out for all utility services* — that means, water, light, heat, telephone and the like—and 98.5% is spent for competing products or services. I recognize that the amount of money spent for utility services in different areas will vary, but it is relatively small in amount and in many cases less than the cost of a pack of cigarettes per day.

*Theer are many unsold customers in the electric utility industry.* For example, one-third of all customers use less than 20 kw.-hr. per month; one-half use less than 30 kw.-hr. per month, and three-fourths use less than 50 kw.-hr.

I could submit many additional proofs of the unsold condition of the market, but I think the two just mentioned will suffice. Certainly your customers are using relatively small amounts of your service; they are paying a very small proportion of their total income for such service; and in too many cases there is evidence that they do not clearly appreciate the value of your service.

**Value of Service**

In order to sell any service there must be an appreciation of the value of that service, and it is only through the coordinated efforts of all interests that the customer may learn to appreciate the real value of the service you have to sell. Thus came the era of partners in a common cause through dealer sales development. The *utility* gains—more people selling utility service; increased public appreciation of the value of service, and more energy sales. The *sales ally* gains—fair competition; wider acceptance for products sold, and the ever important item, more profits. The *customer* gains—better living or better business; earlier opportunity to learn of products, and reliable sources of products and services.

One of the most important fundamentals for utilities everlastingly to incorporate in their sales approach is this: *Sell people the use and they will buy equipment.* Here we have two steps —the utility, through its salesmen, advertising, sales promotion, home service, having as its one objective to sell use of service and then, having created broad customer acceptance, the dealer sells the appliance which immediately begins using efficient, economical utility service, to supply the purchaser with the benefits of *better living.*

Another fundamental is to sell value and cheapness of service, adopt a sound compensation plan, maintain fair merchandising policies, and probably the most important of all—be sincere of purpose.

**Relations with Dealers**

You must keep faith with these dealers—they know their business. They have been in business a long time and will stay in business, and unless the *utility is sincere,* no program of dealer sales development can succeed.

All three benefit from sound utility merchandising policies—i.e. the utility, the dealer and the customer. Such policies include: (1) mark-up which allows dealer a profit; (2) fair installment sales policies; (3) proper charges for repairs; (4) avoidance of subsidies with customer or dealer and exclusive manufacturer representation.

Dealer-utility sales development success does not just happen. It takes organization. The hub of dealer sales development is surrounded by general executive responsibility — the utility sales promotion and advertising department—the residential sales department —the commercial sales department—the industrial and government and municipal sales department. All driving toward a common goal, namely, more sales and more profits for all participants.

It takes real sales promotion and planning by the utility to assure dealer-utility sales development success. Having made adequate surveys of all dealers in your territories, it is essential to consider at least eight steps: (1) analyze the dealer-survey facts, (2) prepare a written plan, (3) provide basic sales tools and aids, (4) provide adequate sales training, (5) dealer sales bulletins, (6) sales promotion and advertising material, (7) compile and analyze sales reports, (8) include all sales allies.

Also it is essential to make dealer outlets more effective. Not that you are running their business—it is up to them to run their own business; but you, circulating as you do among the most progressive businesses in your territory, having the means and back-up to help you do things better, having the contacts with the manufacturers, distributors and the like, you can do a lot to help make dealer outlets more effective. Here are eight steps that will assist: (1) encourage better displays, (2) encourage store modernization, (3) encourage capable salespeople, (4) help dealers train their salespeople, (5) assist in demonstrations, (6) encourage dealer-participation in shows and fairs, (7) help dealers plan advertising, (8) encourage sound policies.

Of vital importance in any dealer-utility sales development program is how the utility salesman is compensated. The old way—the competitive way for sale of a specific appliance—is obsolete in the true dealer-utility sales development program. Under the new way, the utility salesman receives his compensation for sale of total values and benefits of utility service.

There may be times in the drive for new business when times get tough. When the going gets hard we may listen to the plans of short-cuts, bonuses, subsidies or what have you. Let us consider certain things which have wrecked otherwise promising dealer-utility sales development programs. Some of the things not to do—thumbs down on unsound finance plans, rental plans, utility financing of dealer, cash subsidies to dealer, premiums or trade-in allowances unless all agencies can meet them, exclusive dealerships.

You do not need to wet nurse a dealer. He is a business man. There are many sound ways you can really help build up dealer acceptance of your program and then the dealer, through soundly building his own business can tie-in and make a profit through increased appliance sales.

**Necessity for Cooperation**

Sometimes in looking at dealer-utility sales development I am reminded of a successful football team. If we are to get increased sales and make a profit we must go over the profit line by team-work. Here we have a team of all allies guided by a quarterback—utilities—who, knowing the capabilities of every member of his team, with inspiring leadership and correct calling of signals drives them on over the profits line.

It is essential that each member of that football team does his part.

The manufacturer must have: good products, consumer acceptance, dealer helps, sales training, local-use material, volume, profit, and vision.

The distributor must have: adequate stocks, trained salesmen, dealer coverage, volume and profit.

The dealer must have: trained selling, window and interior display, demonstration material, every customer contact, selling proper use, volume and profit.

And, the utility must provide: customer education, sales training, campaign leadership, coordinated activities, vision.

As proof of the effectiveness of dealer-

utility sales development within the group of companies with which I am associated, I submit this chart for your examination. You will note that in the four-year period shown here the total sales have more than doubled, and that this increase is due *entirely* to the increase in *dealer sales*, while company sales have *actually decreased*.

# Adequate Wiring Needs Selling*

By H. J. MORTON
Association of Edison Illuminating Co.

THE capacity of wiring systems in existing buildings has not been increased to keep pace with the growth of energy use. In the case of residences, the usage is increasing at the rate of about 20% per annum, yet the copper capacity has been practically standing still. This condition is largely the cause of a great number of circuit interruptions, lost revenue and increasing customer dissatisfaction.

MORTON

The electrical industry has self-acquired a set of rules and regulations which are incorporated in ordinances and laws and which determine to a large extent the types of materials and the methods for installing them. The basis of these wiring codes is the National Electrical Code.

For a good many years, technical people of our industry have been engaged in studying and analyzing wiring practice with the hope that materials and simpler methods could be developed so that new wiring and changes in existing wiring could be effected at prices which the user could afford to pay. As a result of many years of experiment and field experience of a laboratory nature, just recently it has been possible to arrive at certain conclusions. It is a known fact that failure to "sell" new electrical uses is badly handicapped by the lack of, or the cost of providing, sufficient wiring. You sales people are encountering this with ever-increasing frequency. Appliance sales people are also encountering this problem and they are very much concerned about it.

Adequate wiring involves two essential features (1) Sufficient copper capacity; (2) Large number of places (receptacles and outlets) to connect loads.

In analyzing all the present wiring methods permitted in the code and in various ordinances, we find that in their original design there has been too much emphasis placed on the quantity of insulating coverings and steel for mechanical protection with the result that the copper conductivity is entirely too small. Some of the wiring systems so confine the conductors within steel enclosures that it is impossible to provide additional outlets without practically destroying the building.

A good wiring system should have four basic requirements: (1) Safety, (2) ample copper, (3) accessibility to this copper and (4) economical unit costs.

New materials have been evolved which will provide a solution to this troublesome problem. They have been tested and checked until the best technical minds and sufficient practical experience justify favorable consideration for their use by the industry at large. These new materials have been designed to meet the pressing needs of the re-wiring market. In many cases they are far safer than materials which we have been accustomed to use; but they do not meet the requirements of our present established codes and standards.

It has been my pleasant experience for the past year to visit many localities and to discuss and explain with various electrical groups the merits of changes in existing regulations as proposed by utility engineers themselves. It is highly desirable that you sales people should become well acquainted with the reasons for these proposals—know what they consist of and how all branches of the industry will benefit if they are adopted.

When any change in a style and custom or a habit is intimated, there is a strong tendency to resist progress. That is only an inherent trait of human nature. It becomes an educational task, therefore, to explain the merits of these proposed changes in wiring practice to your respective local industry groups if commercial application of these improved methods is to be forthcoming. This is a sales task and falls squarely on the shoulders of such people as you here today.

Only recently have many utility executives realized the importance of promoting adequate wiring. Many manufacturers have cooperated to work out these improved materials and it is highly desirous that the utility companies acquaint their sales forces with the advantages to be gained—how the public can purchase better wiring at lower costs and yet provide safety—how substantial increased business for all branches of the electrical industry will result.

It requires cooperation on the part of all local industry groups. From my many conversations with contractors, inspectors and others, I am satisfied that they are more than anxious to give this. A great deal of technical information is being made available; many companies are already involved in early negotiations; and I believe all of you here will want to assist in an endeavor to get national recognition to effect a satisfactory modernization of codes and standards relating to wiring.

* An abstract.

# Fundamentals of Rate Making

By S. P. MacFADDEN
Puget Sound Power & Light Co.

THE fundamentals of rate making are not, I believe, too hard to state. The difficulty lies in properly and consistently applying them over considerable periods of time. The fundamentals might be stated as follows:

(1) Rates must give the consumer the most for his electric dollar consistent with the maintenance of the stability and credit of the company. (2) Rates for each class of service should be of a type which meets with the approval, as far as possible, of the average customer using that type of service. (3) Rates must be such as to encourage increased use by the customers and through increased use produce lower rates. In order to do this, they must be competitive with other services. (4) Rates must be so designed as not to develop a load which, while profitable on a small scale, becomes unprofitable as it grows larger.

It is our responsibility to see to it that the maximum benefits of electricity be brought to the people at a minimum cost. Only by so doing can we fully discharge our responsibilities as a public servant. If we do the job in a sound way, we will be able further to reduce rates from time to time and to lower levels than could be reached if we made inappropriate reductions.

In the early days of the light and power industry, rate making was more or less a hit-or-miss affair. Electricity was used only for lighting. Appliances were unknown, and utility executives were not faced with the complicated rate-making problems which have grown

out of the use of electricity for so many different things. Generally, there was only one rate—either a flat rate of so much per 16-candlepower lamp per month or a rate of 10 or 15c a kw.-hr. No matter how much you used, the rate was the same. Then came the development of electrical appliances, the use of electricity for power and heating in industry and engineering rate making. Rates were determined by engineers on the basis of costs with very little consideration given to psychological factors or sales problems. Some of the antagonism which developed towards the electric light and power industry has been, I believe, the result of complicated rates which the people did not understand and of which they were therefore suspicious—equitable as the rates may have been.

A great clamor arose on the part of the people for rates that they could understand, also for low rates. And in the minds of the majority of the people, low rates mean low top rates.

#### Domestic Rates

Our biggest problem is in connection with domestic rates. The problems with commercial rates, power rates and industrial-heating rates are much simpler and can be treated in an entirely different manner. The domestic customer doesn't have and couldn't be expected to have the technical training to enable him to appreciate the fairness of complicated rates based on engineering data, whereas the business man or the industrialist is trained in the consideration of costs and can appreciate the necessity for setting up rate schedules which as closely as possible reflect costs in each instance.

Domestic rates should be simple and they should also, as nearly as possible, reflect costs. The domestic business must carry its fair share of the costs of operation, taxes, depreciation and interest; but we must approach the problem in a little different maner than we do in the case of commercial, power and industrial heating business. Domestic rates must be based on averages to a much greater extent than is possible in the case of other types of rates, and fortunately we can safely do so. The actual variations in the demands and consumptions of domestic customers are not so great as they are in the case of commercial and industrial consumers.

In the U. S. the question of electric rates and particularly domestic rates has become the subject of national interest and discussion. As a result, our congress instructed the Federal Power Commission to make comprehensive rate and cost surveys. One of the surveys and reports was on the subject of distribution costs; that is, the costs from the last substation to the consumer's meter. Generation, transmission and sub-transmission costs were definitely and specifically excluded. That report gave distribution costs for domestic customers for various systems over the U. S., some of them large, some small, some publicly owned, some privately owned and some where there was competition. That report showed distribution costs to average about about $17.50 annually per domestic customer, with costs on some of the systems ranging up to $23. On the average given above, distribution costs per domestic customer are therefore $1.46 per month or more than minimums generally run. On top of that must be added generation, transmission and sub-transmission costs. It is evident therefore that existing top rates of 4, 5 or 6c a kw.-hr. in the case of a small consumer do not return costs to the company. It would, of course, be unwise even to think of increasing top rates. The only solution is, therefore, loadbuilding. We will have to increase the number of the larger domestic consumers.

#### Water Heating Rates

Water heating, of course, offers a great opportunity to increase volume on a basis that will help bring down general rate levels. At the present time, there is considerable difference of opinion as to whether both the upper and lower units of the two element storage-type heater should be off peak or only the bottom element, leaving the top element floating on the line; also whether water-heating energy should be separately metered or the rate so adjusted as to place it on the regular domestic meter. Each of these questions must be separately determined for each system. This is particularly true in deciding whether the booster element should be cut off across the peak. If the system peak comes at a time of day when the booster elements are liable to operate frequently, it is probably better for a while at least to have both elements off peak.

In the case of our company, we decided to handle the water-heating business entirely off peak and on a separate meter. An off-peak water-heating rate was first adopted about the end of 1930. Up until that time we had been selling flat-rate water-heating service. Practically all of it, of course, was in operation across our system peak. We made an analysis recently to determine what the effect of off-peak water heating had been on our system, using for comparison the month of June 1938 and the month of June 1931, and the essential facts learned from that analysis are as follows: Increase in the number of water-heating customers was 2,110; decrease in average revenue per customer was 56c; increase in monthly revenue was $3,400; decrease in system peak was 3,300 kw. At $300 per kw., that means a capital investment of $1,000,000.

We have been promoting the sale of off-peak water heating for a little over seven years. The income per kw.-hr. sold has gone up and the company has recovered about 3,300 kw. of peak capacity for other uses, while the customer has cut his cost of water heating by 56c a month. The customer has therefore benefited—by the equivalent of a rate reduction of about 17%—and an unprofitable business has been turned into a profitable business. Further, with the average cost of water heating reduced, we will secure a larger volume of this profitable business. The progress which has been made in selling off-peak water heating demonstrates quite clearly that what the customer wants for each service is satisfactory performance at a minimum of cost.

#### Danger of Averages

To digress for a moment, we should inform our customers as to the problems involved in rate making, and answer the questions they raise. I have heard customers say, "If I buy 100 pounds of sugar it is so much a pound for all of it—if I buy 1,000 pounds of sugar, all of it is still at so much per pound," and then say, "You advertise that your average domestic income per kw.-hr. is 2.8c. Why can't you just sell it all at 2.8c instead of charging me 5c and charging others who are able to use more as little as ¾c?" You all, of course, appreciate what would happen if a flat price of 2.8c were charged.

The first thing that would happen would be the loss of all of our water-heating business. People just couldn't afford to heat water at 2.8c a kw.-hr. Taking our company as an example, when we lost the water heating business, our average income wouldn't be 2.8c a kw.-hr.—it would be 3.25c a kw.-hr., and so it would go until we had nothing but the lighting business left, and then electricity would be 10 or 15 or 20c a kw.-hr. and we'd be in the dog-house sure enough. It is therefore of paramount importance that we don't do the easy thing and go too far in reducing top rates at the expense of the rate for following blocks.

Before a rate is placed in effect a careful engineering study should be made to determine three things: (1) Will the rate be sufficiently low to secure the business on a permanent basis? (2) How much load can reasonably be expected on the rate? (3) Taking into consideration the characteristics of the system's present and anticipated load

curves, exclusive of the new business, will the additional business in the volume that can be reasonably expected pay its way?

If the proposed rate is not low enough to be competitive with other means of securing the same service but because of other conditions some business is secured, it is only a question of time until the rate will have to be reduced or the business lost, and we all hate to lose business. This tempts us to cut rates below cost in order to hold business. If we don't cut, we lose the business, and then we have made at least some investment which cannot be recovered.

A system may have a certain amount of power at certain times of the day or certain times of the year which ordinary growth or ordinary business may not absorb, and a sale of this block of power for some new industry or some new use for electricity may appear to be extremely attractive, but if the magnitude of the business is not fully appreciated it is entirely possible that in a few years the new business will have changed the shape of the daily or seasonal load curve to such an extent that what was once surplus power is now creating new peaks calling for heavy capital investments on which an adequate return is not being earned.

### Rates and Plans

It goes without saying that sales policies and plans go hand in hand with a utility's rate structure. If certain groups of customers constitute a drain on the net earnings of the system, then the sales department must exert its efforts toward converting the deficit-creating customers into self-supporting customers. With machine-billing methods in general use today, it is relatively simple to develop a running record that will show definitely the magnitude of the unprofitable customer problem. The method we follow is to secure quarterly from the machine-billing department a statement showing the number of minimum bill customers; that is, the number using from 0 to 20 kw.-hr. per month, the number of customers using from 20 to 30 kw.-hr. per month, the number of customers using from 30 to 40, the number from 40 to 50, and so on up to a group of customers using 500 kw.-hr. per month. Charts are then prepared showing the percentage of total customers in each kw.-hr. block. It is obvious that the minimum-bill customer is unprofitable. If sales policies and programs are properly conceived and carried out, the percentage of unprofitable customers should decrease.

One of these charts, carrying the percentage of customers in each kw.-hr. block for the months of June 1934, June 1936 and June 1938, shows that in June 1934 41½% of the company's domestic customers were minimum bill customers. By June 1936 the percentage of minimum bill customers had dropped to 33½, and in June 1938 they were only 25%. The percentage of customers in all the other blocks showed an increase. In other words, the percentage of domestic customers that constituted the greatest drain on the system decreased from 41½ in 1934 to 25% in 1938. Accompanying this decrease in minimum bill customers were increases in all the other groups, with the biggest percentage increase occurring in the group of customers who use from 50 to 70 kw.-hr. per month. June, of course, is one of the months when, because of long daylight hours, consumption is at its lowest and therefore when the greatest number of minimum-bill customers could be expected.

### Uniform Rates

One phase of rate making which has been very much in the public eye in the U. S., and one to which the FPC has devoted a great deal of study and research, is that of rate uniformity over wide areas. There are, of course, the two schools of thought: First, those who believe that rates should be fixed for relatively small areas, each one having substantially the same characteristics as to population density, geography, construction costs and other characteristics; and second, those who believe that uniform rates should prevail over the widest possible area, including cities, towns and rural areas, excluding perhaps disproportionately large metropolitan centers. In this connection, it is interesting to note that revenue per square mile in the City of Seattle is about 180 times as much as the average for the rest of the territory served by the Puget Sound Power & Light Co.

The FPC, in common with many of our state regulatory commissions, is very much in favor of uniformity over wide areas. Our company is a strong believer in uniformity to the greatest possible extent. In the Seattle metropolitan area we are in direct competition with the Seattle municipal plant and the rates of the two competitors are identical. Outside of the Seattle metropolitan area we have only one set of rate schedules. These rates are available throughout the territory from the British Columbia border to the Columbia River.

It is true that distribution costs are higher in rural areas than in more densely settled territory, but there are several offsetting factors to be considered. The first one is the reduction in the number of rate schedules which have to be billed by the billing department. This is a matter of considerable importance in these days of mass production with machine billing. In other words, a greater portion of the revenue received is consumed in billing where there is a multiplicity of rates than there is when rate schedules are few and simple. The second factor is that total consumption in the cities and towns is so much greater than it is in the rural areas that basing rates on costs in rather limited areas would result in very slight reductions in well settled areas, offset by substantial increases in the less settled territory.

Third—and this is particularly true in the Northwest—as our standing timber is removed, the cities and towns must rely more and more for their growth and prosperity on the development of agriculture in the surrounding territory. Properly applied, electricity is of great value in increasing the farmers' prosperity, and all regulatory bodies and utilities should cooperate to the utmost to electrify the farming territory. It may be of interest to you to know that with the cooperation of the Washington State Department of Public Service we have so expanded our rural distribution systems that 94% of the people living in the general areas where we furnish service enjoy the benefits of electricity. This has been the work of a great many years, the first rural extension having been built in 1909, and we feel that uniform rates have contributed greatly to the job that has been done.

### Rates and Consumption

Much has been said about low rates increasing consumption and gross revenues. This, in my opinion, is only true within certain rather definite limits. If electricity for cooking costs more than the cooking service is worth, you won't do any cooking business; but if you reduce cooking rates to a point where electric cooking is attractive, you will with intensive sales efforts build up a cooking load. The same holds true for water heating, for power service and for other uses on the farm, in the home and in the store or factory. After the point is reached where electricity is the economical service or commodity to use for various purposes, further reductions should come only as operating economies are worked out and as net earnings justify. To reduce rates for services where electricity is already economical, when net earnings of the company are not adequate to maintain the market value of the company's securities, must eventually lead to impairing the credit of the company. This, in turn, forces the company to pay higher interest rates for new capital, and this, in turn, will ultimately

lead either to bankruptcy of the company or higher rates for service, or both. In the best interest of the consumer, rates should never be so low as to impair the company's credit.

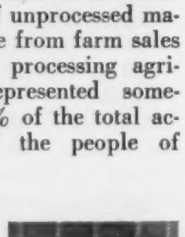
A factor which must not be overlooked in talking about increased use of electricity is the ability of the consumer to purchase appliances to utilize the electricity. Cheap gasoline is of little interest to the man who cannot raise the money to pay for an automobile. The same thing is true in the electric business. Electricity at today's rates in our own territory is such as to warrant its universal use for many applications. I do not believe anyone would question the fact that this is true as to electrical refrigeration, but a relatively small percentage of the people have electric refrigerators. Why? Simply because they haven't the money to buy an electric refrigerator. The Wisconsin Public Service Commission set out to determine how much a customer would have to invest in electrical appliances in order to employ electricity for all the usual uses in the home, including refrigeration, cooking and water heating but excluding house heating. It found the average cost of the equipment for these purposes to be $1,046. The electricity to run these appliances, using the commission's rates of consumption for each appliance, would cost only $7.56 per month in Seattle. It is the first cost of the equipment that prevents almost universal use of electricity for all purposes today.

# Research in Rural Electrification

By F. E. PRICE
Oregon State College

BEFORE I discuss some of the research developments in rural electrification in the Pacific Northwest, I believe it would be well to give consideration to the importance of agriculture in all or part of this region. Since I do not have at my disposal complete data on each of the various states included in this area, I will present an analysis showing the relative importance of income from agriculture in Oregon,* believing that Oregon will serve as typical of the states in this region.

Agriculture is the principal basic industry in Oregon. The available official data indicate that, in 1929, crop and animal production accounted for approximately three-fourths of the value of the state's output of unprocessed materials and that income from farm sales plus value added by processing agricultural products represented somewhat more than 26.9% of the total accountable income of the people of Oregon.



PRICE

The importance of the agricultural industry in the economy of Oregon is apparent from the data in Table I. These data show that in 1929 the four basic industries—agriculture, forestry, fishing and mining—had a total income somewhat in excess of $305,400,000 or 50.1% of the total accountable income of the people of Oregon.

The exact percentage of the value of the manufactured products of the four basic industries which is attributable to agriculture is not indicated by Table I, owing to the method of reporting the fishery and mining industries and the somewhat incomplete data on cash farm income. However, it may be assumed that 50% of the total income from the fishery and mining industries was value added by manufacture and the difference, or 50%, was the value of the unmanufactured production of these industries. The latter would appear to have been approximately $2,500,000 in 1929. This compares with $41,000,000 for unmanufactured timber production and $129,300,000 for unmanufactured agricultural production. Thus, it appears that crop and animal production represented *74.8% of the value of primary production in Oregon in 1929.*

Out of $163,600,000 of income to the agricultural industry in 1929, $129,300,000 or 79% was derived from farm sales of crop and animal products, and $34,300,000 or 21% was value added by the manufacture of agricultural products. From other data, it appears that farm sales of crop products accounted for approximately $62,800,000, or 38.4% of the $163,600,000 total, and farm sales of animal products for approximately $66,500,000 or 40.6%.

Including benefit payments but not income from the farm commodities omitted from the official estimates, the unrevised 1926-1935 ten-year average cash farm income from crop and animal production in Oregon was $97,150,000—49.3% from crop production and 50.7% from animal production.

The relative amount of cash income derived from farm sales of each of the products upon which the government figures are available during the 1926-1935 ten-year period is given in Table II.

A detailed study of the original data indicated that, among animal products, the trend in relative importance as a source of cash farm income appears to have been upward during the past ten years in respect to milk production and the sheep industry, and downward in regard to mohair, chickens and eggs and hogs. There was not much change in the other items for which income estimates are available.

The crop products showing considerable increases in percentage of the total cash farm income include truck crops, hops and greenhouse products, while the trend appears to have been downward for wheat, small fruits and apples. The relative position of the other items appears not to have been changed greatly.

I believe this analysis presents sufficient facts to prove conclusively that the entire organization, as well as the executives of electric utilities in this territory, can well justify the policy of active interest and participation in a program that will contribute to a prosperous agricultural industry in their

**Table I—Oregon Income by Industries: 1929**

| Industry | | Million Dollars | Per Cent |
|---|---|---|---|
| A. Agricultural industries, total | | 163.6 | 26.9 |
| Cash income from crop and animal production | (1) | 129.3r | ... |
| Value added by manufacture | (2) | 34.3 | ... |
| B. Timber and lumber industries, gross | (2) | 136.6 | 22.3 |
| Value added by manufacture | (2) | 95.6 | ... |
| C. Fishery products, total | (3) | 2.6 | .4 |
| D. Mine and quarry products, total | (3) | 2.4 | .4 |
| E. All other income, including construction, transportation, communication, electricity and gas, trade, professional, governmental and other service, and interest, dividends and rents | (4) | 303.6 | 49.9 |

(1) Estimate of the U. S. Dept. of Agriculture, not including flax-seed, flax fiber, Ladino clover seed, Italian rye grass, bent grass, and other grass seeds, vetch seed, field pea seed, filberts, peppermint oil, ginseng, flower bulbs, flower seeds, vegetable seeds, turkeys, geese, ducks, rabbits, fur bearing animals and some other crop and animal products.
(2) U. S. Census of Manufactures.
(3) Statistical abstract.
(4) Derived by subtracting the sum of the agriculture, timber, fishery and mine and quarry income from the total accountable income for Oregon as estimated by the National Industrial Conference Board, 609 million dollars in 1929.
r Revised.

* Oregon State College Extension circular No. 300, "Agricultural Income In Oregon, Sources and Trends," by L. R. Breithaupt.

**Table II—Percentage of Oregon Cash Farm Income from Commodities: 1926-1935**

| | Per Cent | | Per Cent |
|---|---|---|---|
| Milk production | 18.1 | Corn | .2 |
| Sheep, lambs, wool | 11.0 | Rye | .1 |
| Cattle and calves | 10.2 | Alfalfa seed | .1 |
| Chickens and eggs | 6.3 | Small fruits | 3.9 |
| Hogs | 4.4 | Apples | 3.7 |
| Horses and mules | .4 | Prunes | 2.7 |
| Mohair | .1 | Pears | 2.0 |
| Wheat | 15.3 | Cherries | 1.2 |
| Hay | 3.7 | Greenhouse products | .9 |
| Hops | 3.5 | Walnuts | .5 |
| Truck crops | 3.2 | Nursery products | .4 |
| Potatoes | 2.9 | Peaches | .2 |
| Oats | 1.5 | Farm forest products | 2.5 |
| Barley | .6 | | |
| Clover seed | .5 | | |

respective territories. Since agriculture provides such a large part of the income in this region, I believe a sound reason has been established for giving serious consideration to research in rural electrification.

There is no part of the U. S. where rural electrification research has been continuously supported for a longer time by the utilities and by the state agricultural colleges with the cooperation and counsel of agricultural leaders than during the past 15 years in the Pacific Coast region. The research program which started in 1924-25 in this region has continued without interruption in Washington, Oregon, Idaho and California, while many of the similar programs which were started in other states have been discontinued.

During this period, the electrification of the poultry industry was advanced from a position of almost complete unimportance to a position where poultry farmers who are selecting a new location look upon electric service as almost a necessity for efficient operation, and choose their locations accordingly.

Research to determine the value of lights on laying hens during the winter months; the economy, improved quality of chicks and labor-saving value of electric brooding; the electric hatching of chicks and poults has provided a proven program for the rural service departments of the utilities and also for the guidance of manufacturers and sales agencies serving the poultry industry. Research in this field is not completed, however. This was brought out quite clearly in the recent Northwest Rural Electrification Conference held in Portland in January, where progress reports on research in poultry-house ventilation played an important part.

While considering the poultry industry I wish to call your attention to the earlier data which referred to the agricultural products which were on the increase and those which were on the decrease. Note that the income from chickens and eggs has declined in relative importance during the past ten years. I believe the electrical industry can well be interested in those research activities that will assist the poultry industry on the Pacific Coast to maintain its relative position with other agricultural income, and to continue to overcome the approximate 7-day handicap in reaching the eastern egg markets, as well as the freight differential in favor of our eastern competitors. A research program underway at the Western Washington Experiment Station in cooperation with the Puget Sound Power & Light Co. may develop a method of improving the quality of eggs during the period they are held on the farm. This is an outstanding example of a careful selection of a research program that may contribute much to the egg-marketing program of this region.

### Agricultural Development Trend

Further study of the census data shows a more optimistic trend in the income from truck crops, greenhouse products and hops. Truck crops are developing largely around the irrigation program which has made possible outstanding quality and profitable yields. Truck crops have necessitated the development of extensive cannery and freezing plants which have a large labor payroll and which consume large quantities of electric power. This trend in agricultural development justifies particularly favorable comment because it points in the direction of shifting from surplus commodity crops and crops that are dificult to export from the state to canned and frozen-food products, which are being exported from the region, with considerable success. Research which has improved irrigation methods and equipment has contributed much to this program.

Research is underway at the present time for the purpose of developing new varieties of vegetables and berries that have still better quality when presented to the consumer as frozen foods.

The papers on rural electrification research which were presented at the recent tri-year Rural Electrification Conference in Portland constituted a large part of the two-day program. The general subjects which were covered included irrigation, crop processing, poultry-farm electrification and refrigeration.

It is at meetings of this kind that we have learned of the outstanding work in research done by the University of Idaho in developing drainage by pumping, and of their research on dairy water heating, sterilization and on milking machines. Washington State College has made valuable contributions, particularly in poultry-farm electrification and soil heating. I believe the close coordination between research workers, rural service departments of the electric utilities, equipment manufacturers and dealers which was demonstrated at this meeting is the outstanding reason for the very advanced position of rural electrification in this region as compared to most other parts of the United States.

### Rural Electrification Needs

The rural electrification research programs in Washington, Oregon and Idaho, which started in 1924-25 developed many immediately practical uses for electricity. Early research proved that manufacturers would have to redesign and develop new machines to fit into the rural electrification program. Hammermill feed grinders that could be operated by 5-hp. motors were demanded but were only slowly available. Now equally efficient hammer-type feed grinders are available for ½-hp. motors.

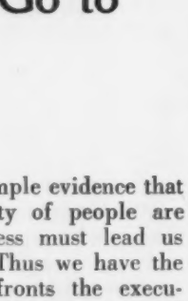
During the depression funds for rural electrification research were generally reduced and have continued on the reduced level. Now with more difficult problems to solve, with a greatly increased hydroelectric power output about to be completed in the Pacific Northwest, on what level should electrification and research proceed? Who is going to develop new uses for this power? Are those who have been the leaders in this development for the past 15 years going to continue in this position, or show down and be out-distanced by a new group?

The excellent progress to date of the coordinated rural electrification program of the agricultural colleges, the rural service departments of the electric utilities and the farm organizations, tested and proved in advance by research, is well illustrated by the 200 to 300% increase in the farms receiving electric service in the Northwest states during the past 11 years. Furthermore, rural electrification ranks at the top with the automobile, the improved highway and the radio in making an outstanding contribution to the farm home and farm life during the past 20 years, and this is particularly true in the Western states.

# Now Let's Go to Work

By C. J. STRIKE
Idaho Power Co.

TODAY there is ample evidence that the great majority of people are convinced that business must lead us back to prosperity. Thus we have the challenge which confronts the executives in industry and business to expand their operations to the end that those desiring work can be gainfully employed in the field of private enterprise.



STRIKE

In my opinion, the first requisite is that government again assume its position as an umpire rather than one of the players of the game, and second, that the rules of the game of business be carefully checked to make sure that they are equitable between the three principles of business, namely, the public, the investors and the employees to the end that business may be conducted on a "live and let live" principle.

For a half century prior to 1930, the electric light and power industry enjoyed public acceptance and a most sensational growth and development. Many of the heritages which we enjoy today, including a substantial portion of our wealth, are directly traceable to the contribution made by adequate and reliable electric service and our other public utility services.

In spite of the fact that no part of the U. S. was ever retarded in its growth and development by inadequate electric service facilities, the American public for the past six years has been told of the dire necessity of the government's entering the light and power field in direct competition with taxpaying citizens and at rates not based upon the true cost of producing and delivering electric service as experienced by private taxpaying citizens, but rather at rates grabbed out of the air or based on a hypothetical condition which does not exist. The American people are confused on the light and power issue and we will never regain the confidence once enjoyed until the issue is clearly stated in the language of the man of the street.

The present investments in the industry of both the municipal and privately owned systems reflect the historical cost of building those properties, piece by piece and year by year as the public demand for electric service required. A fair analysis reveals that the unit investment cost of existing systems built over this period of years in both municipal and privately owned systems compare most favorably. Likewise, the operating costs of producing and distributing electrical energy under similar conditions are comparable, and, when taking into consideration the tax exemption and special privileges which the municipal systems enjoy, the electric rates likewise are comparable with a slight advantage on the side of private ownership. A fair analysis of the period reveals that as an industry the cumulative effect has been that the U. S. leads the entire world in the use of electric service at rates which have been constantly and consistently reduced. Surely we are not obliged to apologize for such an enviable position.

If the federal government had assumed the job of developing this industry a half century ago and had been obliged to meet the constantly accruing factors of obsolescence, depreciation, etc., no fair-minded individual would believe that the government would have done a better job, nor that the cost of electric service would have been any lower, after reconcilement for government subsidy which is charged to the taxpayers directly or indirectly.

It is not a symbol of supremacy to take over the business which the other fellow has developed and, with the latest equipment and operating technic designed exactly to fit the business, make a better showing for the moment. Such an approach would make the same unfair comparison with every other business on main street.

The answer, of course, is that our business today is the result of a historical development and the investment, as well as the operating expense, reflects the degree to which management has met the various changing factors with which that business has been confronted. Such a comparison might very logically be made in the historical development of governmental properties and the operating expenses of the government. If we could by gesture wash out all that has taken place since the beginning of our government, it would not take a very smart man or group of men to design a system which would more efficiently meet the problems of the day.

On the other hand, those charged with the responsibility of management of our government in all its complications are obliged to live with the historical investments, policies, and conditions which have cumulated over the period of years, and here again it would be unfair for anyone to attempt to approach the cost of government under some hypothetical yardstick.

It seems to me that it is our first responsibility to inform the public of the unfairness of such vicious government competition by pointing out that no business, including that of running the government, when obliged to face the cost involved in its historical development, could possibly measure up to a hypothetical comparison of a new streamlined system designed today to meet today's conditions.

I am firmly of the opinion that if the American people truly understood the unfairness of the competition which threatens us, they would not allow the government to use taxpayers' money to carry on such a ruthless program. It has been my experience that the great percentage of our people are fair when they truly understand a situation, and thus it seems to me that the first job of the electric light and power industry is that of reselling our business to the people by proving that we have successfully combatted the elements which have confronted the industry and that electric rates, cumulatively, have been only sufficient to cover the true cost of furnishing this service and carrying what we believe to be more than our just share of the tax burden.

The entire income of the electric light and power industry constitutes approximately 3½% of the national income and there is no justification for all the propaganda which has been created during the past six years relative to the cost of electric service. It seems much more important that the government cooperate with the industry rather than compete with it, to the end that our credit may be maintained and that we may continue to provide adequate electric service.

Our job is one of proving to the people in the territory that the conduct of our business is, and always has been, in public interest and that we are entitled to the same consideration as every other business on main street. Further, that it is unnecessary for the government to use taxpayers' money in a government power program to duplicate or supplement our power facilities. We are ready to match points on the controllable cost of producing and distributing electric energy in our territory and if the public desires cheaper electric rates, it is only necessary to give us the same special advantages of low interest rates by reason of using government credit, the allocation of investment to some misnomer such as navigation, flood control, etc., and the complete exemption of taxation which, in the case of Idaho Power Co. in 1939, takes 25c of every

gross dollar of the company's revenues. Incidentally, so far as we know, Idaho Power Co. is the highest taxed electric utility in the U. S.

Approximately two years ago I discussed the electric light and power question with a high government official. At the close of our conversation he said, "I am convinced that your industry is no better or no worse than business generally, and I feel that you have done an acceptable job in combatting the elements encountered in building your industry from a humble beginning approximately a half century ago to its present status of world supremacy. You are in the political arena, and so long as the issue is popular politically you will continue to be the victim of such a circumstance. Keep out of Washington—go home and take the issue off main street by proving your contentions to the public, and then, and not until then, will the electric light and power business be taken out of politics."

Utility management has been so close to the problems that I sometimes feel that it has been difficult for us to see the forest for the trees. It seems to me that the present situation is not only an opportunity but a challenge to the sales organizations of all utility companies first to resell our business to the public and second to continue our splendid accomplishments in loadbuilding to the end that the public may make greater use of the service facilities which have been provided for them. So, *now let's go to work.*

# Simplify Your Story*

By ASHTON B. COLLINS
Sponsor of Reddy Kilowatt

THE story of the industry needs humanizing, personalizing and simplifying. We have been through four cycles in the industry and are now in the fifth or selling cycle. From the days when the problems were largely technical and financial, the salesmen have fallen heir to the great complicated story of electricity. The question now is how to make that story simple enough for the average person to understand.

We are now in a streamlined age and we need to streamline our selling and advertising approach. Streamlining might have saved the railroads had they adopted it sooner.

We should sell customer benefits. Instead of selling cheapness, we should sell the business up to the value it has for the customer rather than down to rates. Such an approach will get us away from the defensive attitude and permit us to make a positive rather than a negative appeal. This calls for a repackaging of electric service in new and attractive garb.

Remember that a majority of your customers have never finished high school. Remember also, that there is a continuous crop of young new customers coming on every year. We must frame our story in language these people understand. For instance, when we speak of service rendered, we should speak of it in terms of wages and hours of work. They know what this means. They also understand catch phrases and slogans. Don't be afraid to use them. Further, do not overlook the value of repetition. You in the companies may tire of a slogan or catch-phrase oft repeated, but think back on how Coca Cola has reiterated the word "refreshing" or "refreshes" in its advertising until you can't think of this product in any other environment. Coca Cola is still the most popular soft drink in the country. It takes a lot of repetition to establish an idea in the mass mind.

And so I say, humanize, personalize, simplify and repeat your sales story, and be proud to sell up to value rather than down to price.

* An abstract.

# Residential Sales Bureau*

## Home Modernization

By J. F. McALLISTER†
Utah Power & Light Co.

MR. GRIFFITH and Mr. Robinson in their addresses to the conference, said that government generation of power was an established fact and that the capacity thus made available would have to be absorbed. This fact was presented as a challenge to our industry. More power is now available from the projects nearing completion in the Northwest territory than is needed for present requirements.

The Edison Electric Institute recently estimated that the next ten years would develop a demand for electric service for residential purposes which would double our present output.

McALLISTER

Mr. Strike said much could be accomplished through salesmanship, and Mr. Hale depicted selling as an honorable profession, even though it had its inception under conditions reminiscent of patent medicine and high pressure lightning rod selling. We should therefore accept the challenge and go out determined to sell our wares under whatever rules that have been written for the development of our industry.

The residential sales departments of the companies comprising this association meet the issue with confidence. They anticipate with pleasure the job ahead which in the next ten years hold promise of exceeding that which has been accomplished up to date.

How is this to be done? By combining all the agencies now in the field which have been organized to further the use of electricity in the home.

It was pointed out in our committee meeting that 80 to 90 per cent of all the customers being served by the electric utilities were found in the residential field. Any increased use which can be applied to such a large proportion of our customers will, of course, show a vast improvement in the revenues of the utility. We feel such an opportunity exists in the residential field.

My subject—"Modernize The Home Electrically, an All-Industry Job" is the answer. Our committee invited representatives from all branches of the industry to take part on the program of this convention. The manufacturers, jobbers, dealers, and utilities were all represented, and presented ideas and plans which no doubt will be beneficial in load building activities to be adopted by member companies.

* J. F. McAllister, Utah Power & Light Co., Chairman; B. C. Electric Railway Co., H. J. Merilees; The California Oregon Power Co., H. A. Young; Eastern Oregon Light & Power Co., Leon Gray; Graybar Electric Co., F. J. Brien; Idaho Power Co., Fred M. Ingraham; The Montana Power Co., C. J. Burns; Mountain States Power Co., Harold E. Farris; Northwestern Electric Co., J. B. Buman; Pacific Power & Light Co., Guy E. Davis; Portland General Electric Co., J. M. McKay; Puget Sound Power & Light Co., Harley Bryant, Henry R. Kruse; The Washington Water Power Co., Ross B. McElroy; Westinghouse Electric & Manufacturing Co., F. C. Mueller; Westinghouse Electric Supply Co., R. P. Tynan.

† Report of Home Modernization Committee.
† George W. Madison, Portland General Electric Co., Chairman; E. E. Walker, B. C. Electric Railway Co., Vice-Chairman; Chairman, Home Modernization Committee, J. F. McAllister, Utah Power & Light Co.; Chairman, Home Service Committee, Ralph E. Gale, Idaho Power Co.

A utility-dealer policy which encourages dealers to engage in the sale of electric appliances, was presented and discussed at great length. We recognize the independent electric appliance dealer as an ally and a most important factor in our efforts to build residential load. J. King Bryon, managing director of retail furniture dealers of Oregon, rendered a splendid paper on the dealers' participation in electric merchandising, pointing out that only good sound practices in selling appliances should be followed if good dealer outlets were to be built up and friendly public relations established.

The program of the Modern Kitchen Bureau was presented, giving us information on the help which the national organizations offer us in building electric load in the kitchen.

Adequate wiring, "the bottle neck" of our industry, was discussed and no doubt will yield to solution as all other problems do when understood.

Next, we turned to "How To Do The Job." A paper on all service selling was presented which showed the way to greater kilowatt-hour sales. In addition, this type of selling will create a better understanding of value of our service and cement friendly customer relations.

A paper on the electric range as a future business developer was offered to show how we can greatly improve the return on the investment required for residential purposes, if we will add complementary services to it, such as the water heater.

The last paper on the program dealt with a most important subject, that of sales training. The committee subscribes to the axiom that "Knowledge Is Power" and continued training is necessary if we in the new business department are to keep pace with developments in other parts of our business.

# Utility—Dealer Policy

By J. M. McKAY
Portland General Electric Co.

IN THIS territory two general types of domestic load-building are employed. First, where the utilities engage in the direct sale, principally of major appliances and at the same time, under various plans, encourage the sale of both major and minor appliances through dealers. Second, and more recent, is the plan adopted by some companies of building domestic load entirely through the sale of all electric appliances by dealers.

For many years utilities felt that it was necessary to sell domestic appliances direct as rapidly as they were developed, and dealers were given scant consideration in this program. In recent years the utilities have turned more and more to dealers to aid them in domtstic load building, and most of the large utility companies today directly sell only major appliances.

Many cooperative plans have been followed to secure the aid and cooperation of dealers. Some companies compensate their salesmen on a straight salary basis, depending upon the annual revenue of combined company and dealer sales. Others pay salesmen the same amount on dealer sales as on company sales, where the salesmen have shown assistance in making the sales. All companies conduct some advertising or other promotional activity in behalf of dealers.

The type of utility-dealer cooperation used by utilities also selling major appliances varies considerably in different areas, depending upon how densely or how sparsely settled the area served may be, the rate structures, competitive fuels, the possibility of developing satisfactory dealer outlets, and other factors.

The second type of utility-dealer policy is the one employed, where the utilities have ceased merchandising entirely. I shall present the operation and results of our own dealer promotion plan in answer to, "What Constitutes a Good Utility-Dealer Policy, and Can a Satisfactory Load be built by Dealers Only."

On December 1, 1937 the Portland General Electric Co. despite the fact that competition from other fuels in this area was very keen, decided to embark on a complete and vigorous dealer cooperative sales plan with the purpose of terminating all direct merchandise activities over its entire system as rapidly as possible. Since our domestic rates were uniformly low in all our properties, and due to the fact that the saturation of electric ranges in this territory is in excess of 30 per cent, electric refrigerators in excess of 45 per cent, and electric water heaters nearing 10 per cent, our company felt safe in going ahead with the dealer cooperative plan. In addition a large number of dealers had been actively engaged in the sale of major appliances for a number of years, were well established financially and had outside selling organizations. Sixty per cent of our customers are within the Portland metropolitan district, the other 40 per cent are largely in small towns surrounding Portland and in the Willamette and Tualatin Valleys, which are the most densely populated sections of Oregon.

The dealer promotion department, as it is constituted at present in Portland consists of a manager, four field representatives, one display man, three home economists, and two office employes.

The home service department offers to dealers the same service that our own district sales force had enjoyed for a number of years. That is, we will continue to make personal calls on every new electric range user without charge to the dealers. In addition the home economists conduct free cooking classes each week for all electric range users.

Our display man maintains attractive window and floor displays of all makes of electric appliances which are supplied to our store by the distributors on a rotating monthly basis. The display man is also available to aid dealers in making proper window and store displays, and especially to assist dealers in making proper tie-in displays for particular campaigns.

### Educational Dealer-Salesman Program

The duties of the manager and the field representatives are to carry on a continual program of education and instruction for the dealers and their salesmen. This is accomplished in two ways: First, through sales training classes, which consist of cooking classes conducted in our own model kitchen. The course includes instruction in proper methods of approach in making direct house calls, how to develop prospects, correct sales presentations in the home, how to handle floor interviews, successful closing methods, and particular emphasis is placed on selling electric water heater prospects. Many sales training classes are held at dealers' stores, giving pertinent information about company policies, electric rates, kitchen planning and other selling problems.

Direct field help and training is also furnished to dealers who have outside sales crews. Dealer promotion field representatives will make actual calls at the home to aid dealer salesmen and to demonstrate the proper sales procedure to be used in selling electric ranges and water heaters, or in planning an all-electric kitchen.

There is now a sales organization 500 strong—our dealers and their salesmen—who are promoting all-electric service and selling electric appliances on the Portland General Electric system. This has simply multiplied our sales department more than ten times, and yet has made a substantial reduction in our sales cost, since with only 14 dealer promotion men working with this great sales personnel, we have been able to accelerate our load building program.

No dealer cooperative policy would

be complete without an adequate advertising program. Our advertising programs have been built around the Modern Kitchen Bureau's sales promotion campaigns. A majority of the advertisements have been pointed at increasing dealer floor traffic and the development of new prospects. Several ads during each campaign carry a list of cooperating dealers with their names and addresses. We do not solicit tie-in ads. However, a number of the dealers have recognized the benefits to be secured and have voluntarily contracted space for tie-in ads.

The most outstanding and effective sales aid our company offers to its dealers is the Electric Home and Farm Authority finance plan. The Portland General Electric Co. was the first utility in the Northwest to make this cooperative plan available to its dealers. It is designed to finance all major electrical appliances for dealers, where the sponsoring utility agrees to become the authority's fiscal agent. Dealers must submit financial statements to the authority for approval and guarantee all contracts, but the plan offers these dealers the most effective selling tool that the utilities' salesmen have always had, namely, that customers of the sponsoring utility may make their merchandise payments with their electric service bills.

#### EHFA Promotes New Business

The EHFA finance plan is the "Enabling Act" of our dealer promotion program. It has acted as the wedge which has enabled us to secure the dealer's utmost confidence. At the outset of our dealer promotion plan many dealers were reluctant to confide their problems to us. This was a natural reaction because for so many years we had been direct competitors of theirs. While the financial statements required by the EHFA from the dealer were strictly confidential between that dealer and the authority, nevertheless, we found that within a very short time dealers were voluntarily giving us the inside facts of their business problems, and strange as it may seem, even the dealers who had not taken advantage of this plan have confided in us just as freely as those who use the plan.

There are now over 100 dealers on our system using this plan. In a year's operation this EHFA plan has added more than 5,500 electrical appliances to our lines. Thirty-day delinquencies of dealer's merchandise accounts have been less than one per cent and repossessions have been ridiculously low. Naturally, dealers have been exceedingly enthusiastic over the opportunity to use such an effective sales method, and a plan that assures prompt payments of merchandise accounts.

Whether or not it has been recognized in the past, electrical dealers play a decisive part in our relations with the public. Being a part of the electrical industry, these dealers are looked upon by their friends and customers as experts on electric and power questions, and their opinions of private utilities, whether right or wrong, are a tremendous influence in molding public opinion. There can be no doubt that they are one of our best potential sources for good-will building and are as great an asset in that program as they are in load building. This chain of dealers scattered all over our system, transacting business with hundreds of our customers every year are now becoming third-party salesmen for our company.

The total number of ranges sold by dealers to our customers during 1938 was 3,462, as compared with 2,561 in 1937, an increase of 35.5 per cent. Sales of electric water heaters by dealers during 1938 did not make up in volume for the decrease caused by the discontinuance of our own direct sales force. We had anticipated that this would occur. However, the trend of dealer water heater sales as shown by the increase in sales of 1938 over 1937 was very encouraging.

During the year 1938, we feel that we have laid the groundwork in intensive training and educating dealers and their salesmen in the sales opportunities that electric water heaters present. At the beginning of 1939 there are more than twice the number of dealers there were in 1938 who display and sell electric water heaters. We confidently expect that the number of electric water heaters sold by dealers during this year will approximate the volume of our own sales department during the year of 1937.

Because of a change in our accounting methods, it is almost impossible to compare the cost of our dealer promotion plan with that of the company's previous direct sales department. However, our management is convinced that the cost of this dealer cooperative plan is considerably less than a direct sales operation.

#### Prospects for Dealers Plan

Since we have no salesmen, and all prospects for dealers are allocated by the manager of the dealer promotion department, there can be no possibility of favoritism. A prospect distribution record is kept each month and checks are made daily to insure equal distribution. We do not receive a large number of prospects, but those we do result in a high percentage of sales for the dealers.

This experiment in a dealer cooperative plan, with the local utilities completely out of merchandising is, no doubt, being watched with interest. After having spent a year and a half in actual field work, where I have been able to get first-hand knowledge of the results secured by this method, I have found that it has resulted in increased sales on all appliances, except water heaters, vastly improved dealer and public relations, and greatly reduced new business cost. To be successful, however, it is imperative that dealer cooperative programs provide as nearly as possible all the sales helps that the utilities' own sales departments previously had, that the utilities promote vigorous advertising and sales campaigns, and that dealer promotion departments be organized to effectively coordinate all utility-dealer activities.

## Discussion

In response to questions, Mr. McKay brought out the following additional points or amplifications of points in his paper.

J. M. McKay—The company's advertising program is wholly promotional in character. It is built around the National Modern Kitchen Bureau campaign. We do not ask dealer participation but dealers generally take tie-in space in connection with our programs.

We have 14 company representatives acting as dealer contact men on our entire system. Four of these men are in Portland and the Portland territory is divided into two parts with two men in each part. Each pair of men cover their own territory, but are not assigned to particular dealers. One man usually devotes his time to the proprietor or manager in the store while the other works with the salesmen.

Prospects picked up by our men are allocated to dealers on the basis of the number of outside salesmen employed by these dealers. The dealer having 10 salesmen will get 10 times more prospects than the dealer having only one salesman. We check on these prospects after about 15 days, and if the prospect has not been sold and is still considered "live," he is turned over to another dealer. Most of these prospects come from our new business department when they contact owners and builders for electric service. We pay no bonuses to these men for turning in these prospects, but have been successful in getting cooperation from them.

We have discontinued offering our kitchen planning service to all customers, but we still maintain the service for dealers who request it, and we help the dealers sell the idea of planned kitchens.

# Dealer Participation in Merchandising

By J. KING BRYON
Managing Director, Retail Furniture Dealers of Oregon

AS MOST of you know, I lend my humble efforts to the direction of the affairs of the Retail Furniture Dealers of Oregon, as well as being closely identified in a like capacity with one or two associations that enjoy the membership and hearty support of our utilities. So it is that I have had the opportunity to and have made a careful study of the problems of both dealers and utilities and have learned, as others have, a great many things that have helped in solving some of our problems. Over a period of time the utilities have developed what might be called scientific merchandising, having realized from considerable expenditures over many year how to judge the public reaction to promotional advertising, particularly as it deals with the seasonal influences. The live, wide-awake dealers follow this leadership by the utilities and spend their advertising appropriations when they will reflect the greatest returns.

### Utility Promotional Advertising

It is known that the utilities will continue to sponsor advertising programs, stressing the value of utility service and directing floor traffic into dealers' stores. The burden of doing this developmental work is therefore taken from the dealer, enabling him to carry on an advertising and selling program built around the particular products he carries. The assumption of the strictly promotional advertising by the utilities will therefore enable the dealer to get much better results from his advertising expenditures.

There is a broad realization of the fact that government expenditures for electrical development in this area have focused the attention of the buying public on the value of electric services. It is singular that there has been no detrimental publicity or propaganda which would in any way detract from the benefits which the customers will enjoy and consequently a developmental program by the utilities will be beneficial to dealers to the extent that they capitalize on the utilities' efforts to popularize electric service.

In carrying out the utilities' dealer coordination plans, the primary objective is to build good, sound, stable dealer outlets and to foster policies that will encourage dealers to adopt long range policies in the conduct of their business. Alert dealers will take advantage of the activities and programs that the utilities sponsor.

Utilities' selling organizations during the past years have been built up around the principle that it is more important to sell the need of the service and the advantages to the ultimate customer than the product itself. Consequently the coordination departments of the utilities endeavor to carry out in their sales training work with dealer organizations the same fundamental type of instruction which has been given to their own salesmen. As long as appliance selling is specialty selling, sales people must appreciate its fundamental difference and meet the necessities of the situation. Trained utility employees are able to bring counsel to the dealer on the subjects as varied as his business is, and there have been notable examples where such counsel has been accepted with resultant improvement in the dealer's selling and business methods.

It has been proven by experience that dealers are more successful if they departmentize their business where items other than electrical merchandise are sold.

### Sales in the Home

The successful dealer, of course, recognizes that the greatest measure of success in appliance selling comes through his operation of trained salesmen who solicit business outside the store and in the prospect's home Sixty per cent or more of all appliance sales are made right in the customer's home. It is obviously just as important in trying to interest the prospect in an all-electric kitchen that the family be consulted with the salesman present as it is to do this in selling new home furnishings or new automobiles. Further advantage of specialty sales crews lies in the fact that the maintenance of such crews imposes an obligation for special training and centering of the effort of such men on a definite job.

Developments indicate that if the utilities, in their dealer coordination program, are to enjoy the fullest support and confidence of the dealer, their coordinators must refrain from direct selling activities for favored dealers except in those cases where it is necessary to train new salesmen by demonstrating the technique of sales approach, proper presentation and methods of closing. There should be no attempt made to use dealer coordinators to close sales for weak and inefficient sales people. If it is the purpose of the utilities to supply dealers with prospects, this also must be done on a fair basis which assures all dealers of the opportunity of receiving their fair share in proportion to their selling effort on the prospects so distributed.

One problem encountered in the utilities' cooperation with dealers is a tendency on the part of some dealer organizations to feel that utilities should discontinue making appliances available to their own employees at less than regular retail prices by issuing such employees purchase requisitions through their purchasing office. It has been the policy of most major manufacturers and their distributors to encourage this attitude on the part of utility people, and utility people have in turn felt that the widespread use of appliances by employees would lend support to its promotional programs through the enlistment of employees' help in popularizing use among their friends and neighbors. I am advised that the major portion of retain prospects originate through the rank and file of utility employees. If the practice of purchasing appliances for employees is to be continued by utilities, very definite restrictions should be placed upon the issuance of purchase requisitions. In no case should the employee be permitted to purchase directly from the distributor and his purchases should be limited very definitely to purchases for the employees' own personal use and not for immediate relatives or friends.

As a corollary manufacturers and their distributors should avoid making direct sales to ultimate consumers, thereby circumventing dealers in their efforts to obtain a legitimate profit on this class of business. In Portland this situation is protected by municipal legislation prohibiting such type of sales.

Manufacturers, distributors and their salesmen should not condone flushing sales through unethical dealers who will cooperate with them for brokerage profits.

### Benefit of Dealer Associations

Naturally I might be expected to say that I recommend the association of dealers in a group for the protection of their profits through such an organization as the Central Appraisal Bureau or the Gas Appliance Society or any other association which will promote the interests of dealers. Such associations, to be beneficial, must have the active participation of utilities.

It must be realized that the dealer is the ultimate profitable outlet through which all goods must be sold, and it should be the aim of all other factors in the industry to protect the profits of this group, and thus increase their value as a distributing agency. Based on experiences to the present time, I can confidently say that where local situations require that the utility remain in the merchandising picture, all of the foregoing can be applied to its operations, and if this is done it will encourage the growth of dealers where

they are not a factor today, thus giving added impetus to the utilities' efforts and hastening the time when the utilities will find it advantageous to withdraw from merchandising themselves.

## Discussion

By LEON G. GRAY
Eastern Oregon Light & Power Co.

IN OUR territory consisting of small towns and restricted rural districts we are actively engaged in selling ranges, water heaters, refrigerators, lighting and the promotion of other electrical equipment.

We have a range saturation of 27 per cent, water heating 6 per cent and refrigeration 55 per cent. We extend time payment contracts 24 months with 10 per cent carrying charge. At the present time there are two finance companies and these, with the local banks, meet our needs in financing dealer sales. We sell at manufacturers' list prices with allowances on trade-ins regulated by the dealers.

Our promotional program is dealer cooperative and we promote all service selling.

As a basis for laying the foundation from which eventual sales are gained, our engineering department prepares rural district maps giving information regarding the use of electricity and the dealers from which they may expect to be served. New rural districts are continually being added to the load building program providing new customer outlets for dealers.

Town residents are also contacted regularly in order that we may keep them sold on the service they are now using and to promote additional service, thereby creating new markets for dealers and increasing our load.

We keep a complete file of detailed information regarding each customer so that this information is available for the asking.

We cooperate with the dealers to the extent of 85 per cent of our newspaper advertising, using tie-in ads and instructional advertising featuring Reddy Kilowatt, Modern Kitchen Bureau and Better Light—Better Sight.

Recently we have been sponsoring radio broadcasts, tying in dealer advertising featuring Reddy Kilowatt.

We do not maintain a home service department. However, cooking schools in our territory have brought very satisfactory results and provided a means for dealer-customer contacts. Registration cards of customers secured at these schools furnish an important source of information for reference.

We call on dealers at the end of each month to secure the number of appliances sold and to discuss mutual problems of interest. We encourage our dealers to study our rates and average operating costs of major appliances so that they may estimate approximate operating cost for customers.

We offer free wiring on electric ranges and water heaters sold by dealers and utility. This has been our biggest sales aid during the year.

We have added 90 kw-hr. per customer during this past year.

We feel that our dealer policies of cooperation stimuate interest in selling on the part af the dealer where, if we were not taking an active part in a load building program, dealers alone would not create new markets for appliances.

## Modern Kitchen Bureau

By F. H. HARRIGAN
Modern Kitchen Bureau

THE Modern Kitchen Bureau, though only three years of age, has had the good fortune of prospering to an early maturity. Utilities and electrical dealers throughout the country have in the majority of cases cooperated with our various programs whole heartedly, giving us thereby the necessary incentive to keep alert and on our toes.

HARRIGAN

The original intent of our bureau, as you are aware, was to promote the complete all-electric kitchen, embractric kitchen, embracing the sales of all major and small electrical appliances. This thought prevails today. However, during this last year experimental activities on individual appliances were run on a national scope. This proved so successful to everyone concerned that our sponsors decided upon this procedure as a definite line of attack to follow again this year.

Five distinct programs will be released in the first six months of 1939: (1) the electric range, (2) the electric water heater, (3) the electric roaster, (4) the electric refrigerator, and (5) the all-electric kitchen.

### The "Guess Again" Electric Range Activity

This activity will be centered around the most concentrated electric range advertising that has ever helped you sell. Full pages in color in the Saturday Evening Post, appear March 29, April 19, May 3, May 17 and June 7. These ads will break down the mistaken idea that thousands of people have that electric cookery is costly. The theme "Guess Again—Electric Cookery Costs Only ½ That Much" will be prominently displayed, not only in the advertising but on all materials. The women in your territory who want electric cooking will quit guessing, and wake up to the fact that they can have it because electric cooking is low cost cooking. The ads will not only sell them on economy but speed, cleanliness and many other advantages that electric ranges offer as well.

Concentrate your selling efforts at the same time national advertising is selling for you. Sign your name to this great program by using materials we have made available for you; such as window posters, jumbo ads, counter cards, letter head, stickers, newspaper mats and radio announcements. Train your salesmen to sell low cost electric cooking. Supply them with local low cost proof—actual users' bills.

### Electric Water Heater Activity

The electric water heater activity for this year, while similar to that of last year, is somewhat enlarged. From time to time during the year additional plans and materials will be released. The program is of such nature that it can be readily tied-in with each of your local promotions.

To start the ball rolling we are offering $2,800 in prizes for utilities, dealers and their employees. The first national electric water heater award will be $1,000 and a silver trophy to the utility doing the best all around job. The utility executives award will be $300 for first prize, $200 for second prize for the two best papers on the advantages of the water heater load. We will offer for dealers or utilities awards of $100 first prize, $50 second prize and ten prizes of $10 each for the best window displays on electric water heaters.

Newspaper advertising awards for dealers or utilities will be $250 first prize, $100 second prize and $50 third prize for the best campaigns.

A contest for dealers or utility salesmen offers $100 for the grand prize, four prizes of $25 each, four prizes of $15 each, four prizes of $10 each and twenty prizes of $5 each for letters on "How I Sell Electric Water Heaters."

Real sales tools are available to help you sell electric water heaters. We will have window banners, visual manual, newspaper ads, radio announcements, manufacturers mats and a double pur-

pose selling booklet for your salesmen and your prospects.

Combine our program with your own. It will help you sell water heaters in volume in 1939.

**Electric Roaster Activity**

The roaster activity will be centered around a three year national advertising program. The first of these ads was released in the March issue of "McCalls Magazine." In addition to this, "Woman's Home Companion" and "The Saturday Evening Post" will carry ads. Throughout 1939, 1940 and 1941, at the rate of one or more ads each month, they will be blazing away telling the roaster story to your customers. "Easier Cooking-Easier Living" is the theme song for roasters, and it certainly means just that.

Here's how to sign your name and address to the national ads; make your individual stores roaster headquarters. We have made available for you plenty of sales tools so that you may identify yourself with the national program. There are window banners, counter cards, sales training booklets, jumbo ads, newspaper supplements and mats, radio announcements. Here again it is the same old story, national promotions will create desire in the minds of your customers, but to receive the benefits, you must tie-in locally.

Identify yourself with these activities, use the promotional materials, expose yourself to this business and you will get your share. The refrigeration plan book and the overall kitchen plan book will be released soon. They will be packed with sound merchandising ideas, and I feel certain that if they are used each and everyone of you will benefit.

## Discussion

By J. B. BUMAN
Northwestern Electric Co.

The National Modern Kitchen Bureau has been particularly beneficial to utilities, manufacturers and dealers in the sale of major appliances. Homes today must have streamlined, modern kitchens that save the energy of the housewives. Due to the advertising of the Modern Kitchen Bureau, when people think of a modern kitchen, they think of the all-electric kitchen.

Here are the results of a questionnaire on kitchen planning sent to seven utilities in the Northwest.

1. Six companies maintain a kitchen planning bureau for residential customers. Five are quite active, while one uses the manufacturers' plans.

2. Four maintain an independent department. One has a department operated through architects outside the company.

3. Five companies report 1,111 kitchens designed in 1938.

4. The unit cost of these plans runs from $3.50 minimum to $13.00 maximum per plan. Under the high cost plan, the company pays $5.00 for the plan and $8.00 for a color scheme to outside architects.

5. Only two companies keep a record of actual accomplishments. One reports 107 plans put into effect out of 196 drawn. The other reports completing 100 jobs out of 150 plans.

6. Five companies plan to continue the activity during 1939.

7. Five companies furnish plans to dealers free. One company furnishes plans to dealers through a better housing bureau to which the dealer must belong, paying a membership fee.

# Wiring Adequacy Aids Merchandising

By R. P. TYNAN
Westinghouse Electric Supply Co.

THE LACK of adequate wiring is the bottle neck that is holding back sales of both kilowatt-hours and electric current consuming devices. We in the industry know that. But the general public knows little about the subject and cares less.

From the days of the old Society for Electrical Development on down through those of the Red Seal plan to the present, there have been national movements looking toward more adequate and better wiring. They cost considerable money at the time and did a certain amount of good. But by the time they percolated through to the public they were very much diluted. The way I look at it, the educational work, the propaganda, if you please, must be carried on locally, or at least by geographic sections such as our Pacific Northwest, to be effective.

The whole problem can be summed up in four words: "We want more copper." At the present time, the kitchen is the focal point. There are so many current consuming devices that we wish to sell there, and that the utilities wish to see placed there.

The field divides itself into two main classes—new homes being built by owners and old homes that should be rewired. Here in the Northwest we have reached a remarkable degree of range saturation in modern homes. It is to the re-wiring of older homes that we must look for the greatest percentage of change, and many of them occupied by renters.

To do the job right, let us set up No. 6 or No. 4 wire as the minimum that we can recommend for the service entrance. What codes may say is safe is not all that we require from a merchandising and good service standpoint. Even the city electrical department of Portland in its new code has taken many forward steps to help us out along merchandising lines. And if No. 6 in the kitchen, why not all over? Soon millions of kw.-hr. of electricity will be begging for a chance to work all over this Northwest. The electrically heated home is not just a wish any more. Rates and technical improvements have advanced to the point where the public will be demanding this type of service. Then what? "We want still more copper."

The answer is that our public has got to have some personal education. No woman will ever care to know how many circular mils there are in a No. 6 wire. What we have got to get over to her is that too small a wire will not do the job she wants done in her home now and in the future. Let us tell her what size she should have to make her house modern. I say "her," because it is the woman who is designing and studying the home today. There was never such a poring over plans and studying of equipment catalogs on the part of women as there is now. Everywhere she is putting her personal touches into the building and furnishings. Out come the shades of yore, and up go Venetian blinds at twice the cost. If we muff the ball now and don't give her the "more copper" ideas to which she is entitled, we are sunk, and ought to be.

The woman of today is not particularly concerned whether it costs $75 or $125 to wire a house, unless we force the idea on her. When she is shown that she needs to put a very little more into the wiring in order to have all the electrical appliances she wants, then if she finds she is running a little short she may cut some off the shrub bill to boost the wiring adequacy. It is easy to grow shrubs later, but it is hard to grow more wiring after it is once in.

Does house wiring now cost too much? There is a school that thinks it does. I don't belong to that school, because I don't think anybody knows what is too much. What the wiring will accomplish is the real question. Some time ago the plumbers got the bulge on us. They put in beautiful bathtubs and fittings at fancy prices. Did they do it by saying "If you will put in a quarter inch pipe to that toilet and a half inch pipe over here, it will cut $10 off your piping bill?" Hardly. They put in pipes everywhere big enough to flood the place, and nobody ever questioned.

They built up a wonderful business in face of the fact that their prices for all labor and materials were popularly believed to be so high that it became a national joke. Today, the kitchen is more elaborate and represents more equipment investment than the bathroom. Let's quit talking about the cost of wiring, and talking about the advantages, and what is required to fit out the home properly.

Who is going to tell the woman or home builder the simple fact that a wire has got to have some size to do a modern job? I think the utilities are the ones to take the lead. They are big enough and have sufficient contact with the whole public to tackle the job, but they should have the backing and support of the rest of the electrical industry. The utilities have large sales organizations or large sales promotion organizations contacting and working with the electrical contractors and dealers. The electrical wholesalers also have as many or more salesmen working with these same dealers and contractors. The contractors and dealers in turn are working with the public as effectively as they can within the limits of their possibilities. There's your army.

**Promote Adequate Wiring**

What would happen do you suppose if the utility in its newspaper advertising, its radio advertising, in its bill enclosures, were to say "Madam, in planning your new home, or in re-wiring your present one, remember that in these days bigger wires are necessary to permit you to have all the electrical appliances you are going to need. Watch for the displays next week." Then with your organization and with the help of the rest of us, see that every one of your contractors and every one of your dealers, including department stores, furniture stores and the rest of them, receive and put up this simple, standardized display: A good sized board with a No. 12 wire and a No. 6 wire with the insulation peeled back. Letter it plainly: "ADEQUATE WIRING." "This little wire will do for a few lights." "It takes this big wire to handle ranges, water heaters and heavy appliances." "Don't let anyone ever induce you to send this little boy to do this man's work."

It might be necessary for the utility to make up such standard displays for its dealers and contractors. The main thing would be to have them out everywhere at once. Work them for a stated period; then come out with another idea, then another, and still others at regular intervals. It would not take much more money in advertising than you are already spending. Just devote a significant part of your newspaper, radio and other advertising space to the promotion of this adequate wiring idea.

**A Leader Needed**

What is needed is a plan for pounding and pounding on the one definite idea—concerted effort. You can't expect the contractors alone to start off on the idea or the dealers, or the wholesalers, even. They need a leader. But with such a leader, with a simple plan which all thoroughly understand and that is not too involved, I believe all these elements can be brought together with a heave-ho that will put the thing over. It might be worked out by individual utilities or as a joint undertaking on the part of all the utilities in this section.

There are two things that would help this promotion that I would like to mention specifically. One is that a way be devised so that all wiring, whether in old homes or in new homes being built by the owner, could be brought onto the installment plan basis, to be paid for through the utility, where the owner so desires. The other is, if possible, to resume the free range wiring campaign on an indefinite basis. In the recent past, this was one of the greatest helps we ever had in selling ranges. This was not solely because of the lower total cost to the customer, but also because it eliminated an element that required looking into and settling before the range could be sold.

I will conclude by bearing down once more on the point that it is not a great, complicated educational campaign that is needed here. I wouldn't have a single booklet or broadside in the whole thing. I think it could be reduced almost to a slogan. All the people need to know is that there is such a thing as too small wires to do an all-around effective job. Ninety-one out of a hundred don't know that the size of a wire has any bearing on its capacity. When they find out, they will be calling for the right kind.

## Discussion

Consensus of those discussing this paper was that the public doesn't care about wiring because they don't know what constitutes adequacy. All agreed that the job of selling the idea to the public was one for cooperation of all branches.

F. M. INGRAHAM told of the bureau started by the Idaho Power Co. in its territory in which about 60 meetings were held to discuss adequate wiring.

GEORGE MADISON stated that his company had arranged with E.H.F.A. to include the financing of wiring and re-wiring installations of $40.00 or more in the same manner as the sale of appliances is being financed by that organization using Portland General Electric Co. as collection agent. He pointed out that one of the chief deterrents to promoting adequate wiring with the public was the practice of electrical contractors, due to intense competition, of bidding the job down rather than selling it up.

J. H. TAYLOR told of the success of the Red Seal program in Vancouver, B. C. sponsored by a local cooperative organization.

All agreed on the necessity of an educational program in which the use and need of adequate wiring would be built up in the minds of the public.

# All-Service Selling

By GUY E. DAVIS
Pacific Power & Light Co.

A CONSISTENT policy of all-service selling over a period of several years through an aggressive dealer-company residential sales program on the part of Pacific Power & Light Co. has resulted in a constant increase in the average kw.-hr. consumption per customer with a resultant decrease in average cost.

After a careful survey of results to date, having in mind the best interests of all concerned, including the customer, appliance dealers, allied interests and the company, we are proceeding with a long range all-service selling program with the following three major objectives in mind:

1. To improve customer, dealer and employe understanding of the value and cheapness of the use of our service.
2. To cement friendly customer, dealer and employe relations with the company.
3. To promote greater use of present services and further the sale of additional services.

Such a program if carried through to a successful conclusion will result in: (A) better living for our customers; (B) increased sales for appliance dealers and other industry allies, and (C) increased revenues for our company.

We are laying out a definite and systematic procedure that will result in the best possible use of available time on the part of each employee engaged in contacting our customers. In order that they may, first, have a definite understanding of what is expected of them in the way of imparting information to the customer relative to the company and its services, and, second, be equipped to make such contacts in an efficient and intelligent manner, we

are inaugurating a sales and service training course, which, while primarily intended for members of the new business department, will be available to the entire company organization. This will (1) furnish a complete job analysis for customer contact employees; (2) impart pertinent information with respect to carrying out the job in detail; and (3) provide a concise sales technique which, while in keeping with modern methods of salesmanship, is particularly adapted to the needs of a utility service salesman.

This program may be briefly summarized as follows:

1. Interpretation of a "Sales Call" as it applies to a utility all-service selling program.
2. Responsibilities of a utility residential sales representative.
3. General outline of sales promotional activities.

#### The Sales Call

A "Sales Call" should be interpreted to mean a call made in person by a sales employee on a customer or prospective customer for the purpose of selling the following:

Collateral advantages of company services.

New service to prospective customers.

Additional services to present customers.

Resumption of a discontinued service.

Increased use of services now being used.

The retention of a present service which the customer contemplates discontinuing.

#### Responsibilities

1. To canvass systematically his entire territory within a given period.
2. To sell the value of the Pacific Power & Light Co. as an asset to the community and to each individual customer.
3. Be alert to locate and correct customer complaints of service, unsatisfactory performance of equipment, rates charged, etc.
4. Encourage greater use of appliances now in service and prevent load mortality through (a) equipment repair, (b) reselling value and appreciation of electric service, and (c) replacement of worn-out or obsolete equipment with new and modern appliances.
5. Sell the use of additional services to present customers and to new customers by emphasizing benefits to be derived and economy of operation.
6. Follow up all appliances sold to determine that (a) the equipment is properly installed and operating correctly, (b) the customer is entirely satisfied with the purchase, and (c) the customer understands thoroughly how to derive the maximum benefits from the equipment.
7. Adhere at all times to policies pertaining to an overall dealer-company cooperative sales program designed to create maximum uses of the services offered by the company.

In carrying out individual assignments as outlined in the above seven points, sales representatives are at present responsible for definite territories consisting of from 1,500 to 2,500 residential customers. Ultimately we hope to cut such assignments to the point where full coverage may be made within a period of not to exceed 12 to 15 months.

#### Sales Promotional Activities

*Newspaper Copy*—Tying in with the nation-wide promotional activities of the E.E.I., we are featuring the all-electric kitchen, the all-electric home laundry, light conditioning, table cookery, etc. in all daily and weekly newspapers operating within territory served by the company. At the same time, appliance dealers are urged to tie in with a product story pertaining to equipment offered for sale by them.

*Outdoor, Radio and Mailing Inserts*—All outdoor posters, radio skits and spot announcements as well as mailing inserts are devoted to service advertising with only an occasional reference to appliances offered for sale by the company.

*Equipment Sales*—The direct sale of appliances by company sales representatives, although a complete line of household equipment with the exception of radios is offered for sale, is secondary to the overall promotion of greater use of the company's many and varied services which in turn will mean greater sales of all types of equipment within the territory served by the company.

*Home Service Department Activities*—Home service department employees are given special training pertaining to the promotion of adequate lighting in the home as well as to the operation of all household appliances and their services are available to dealers and company on an impartial basis.

## Discussion

By F. C. MUELLER
Westinghouse Electric & Manufacturing Co.

Utility promotion and selling should stress the low cost to operate appliances. Utilities should approach the dealer from the profit point of view. Utility employees should all be trained to tell the same story. Salesmen's compensation should be designed to stimulate sales of all merchandise items large and small.

# Electric Range as a Business Builder

By H. J. MERILEES
B. C. Electric Railway Co.

THE FIRST thing to consider would be the distribution and investment problems created by the electric range. These are largely local and vary with each company. An excellent paper was given at our last meeting by R. Rader of the Puget Sound Power and Light Co. covering exhaustive tests made to ascertain the effect of the range load on the Puget Sound system. Similar charts are available from the Washington Water Power Co., Utah Power and Light Co., Pacific Power & Light Co., Portland General Electric Co. and the B. C. Electric Railway Co.

Here is an analysis of what ranges mean in terms of revenue and return on the investment in general terms as a basis for discussion.

An average customer without a range consumes 900 kw.-hr. with 1 kw. maximum demand on an investment of $300.00, returning a gross revenue, at our Vancouver rates, of $24.20, showing a gross return of 8.06 per cent. The addition of the range boosts this consumption figure 1320 kw.-hr., raising the average maximum demand 0.7 kw. with an additional investment of $210.00. We estimate an additional gross revenue of $26.40 giving us an estimated gross return of 12.57 per cent. This brings our total of 2,220 kw.-hr. with a demand of 1.7 kw., an investment of $510.00, a total gross revenue of $50.60 and a raise of our gross return from 8.06 per cent to 9.2 per cent. No allowance for wiring bonuses is included in these figures.

One of the first things to consider in discussing this subject is the trend in revenue from the range. This is affected by three factors: (1) efficiency of the equipment, (2) rate reductions, and (3) methods of living.

Constant improvement in manufacturing and engineering methods have certainly increased the efficiency of ranges. Open-type porcelain embedded elements with exposed resistance coils have been replaced by Calrod, Chromalox and other types which carry alloy covered plates, thereby reducing replacement expense to a minimum and at the same time adding to the efficiency of the unit. Any effect that this might have to decrease consumption has been offset by fewer breakdowns which tends to keep up the full potential earning value of the surface elements. Ovens of ten years ago are not as economical as those of today and there is probably a

slight decline in consumption by the average 5 to 8-kw. range of today. It might be worth mentioning here that many companies, after a review of consumption figures, have revised their previous estimates of annual revenue downward.

Rate reductions will probably continue, thus decreasing the gross revenue from the range, but this factor is offset again by the lowering of the investment.

Methods of living affect the revenue per range because changes in living habits will affect, in one way or another, the use to which the range is put. Present day tendencies to live by the aid of a canopener and a delicatessen store, with formal meals taken in a down-town restaurant, certainly lessen the use to which the range is put. In helping to promote methods of living that call for greater use of the range in the home seems to be our best chance of increasing consumption per range.

#### Encourage Home Cooking

Cooking classes are a factor in insuring greater use of the range in the home. We must by better home demonstrations, recipe service and better kitchens encourage more actual cooking in the home. Even such a factor as the increasing demand for frozen fruits and vegetables in the Northwest can be of assistance in this regard.

The general effect on the other uses of electricity in the home is probably the most important future for the electric range as a business developer. The installation of an electric range in nearly every case creates the problem of an adequate supply of hot water and from a standpoint of immediate benefit in revenue, as well as load factor and investment, the off-peak electric water heater provides the most valuable revenue-producer. Ranges and water heaters are complementary appliances both from a load building and a competitive fuel standpoint. The water heater will utilize the off-peak capacity without adding to the peak in any way. There is a school of thought in Portland that argues against the necessity of controlling water heaters off-peak, but for purposes of this discussion let us analyze what the addition of the off-peak water heater will mean.

To our previous total of 2,220 kw.-hr. add 4,800 kw.-hr., bringing the new total to 7,020 kw.-hr. It will add nothing to the maximum demand leaving that figure constant at 1.7 kw. It will add $30.00 to our investment of $510.00, making the total investment now $540.00. At our Vancouver rates it will add $38.40 to our previous total revenue of $50.60 giving us a new total of $89.00. and it will push our gross return from 9.2 per cent to 16.48 per cent.

The fact that northwestern utilities appreciate just how important the water heater load can be is borne out by the active promotion of many member companies and water heater saturation figures are mounting steadily, some of them being as high as 36 per cent. That the electric range has definitely led to the development of the storage water heater is an undeniable fact and if nothing further is developed for a number of years it would be safe to say that this development has justified the expense of electric range promotion.

The installation of an electric range is certainly the most important first step in teaching the benefits of the electrical way of living. While our kitchen planners state that the most important first appliance is the refrigerator, nevertheless, the public definitely puts cooking ahead of food preservation and the range is the heart of every home. Once a home owner cooks electrically, ready acceptance for almost any domestic use of electricity follows. The electric range led us to the water heater, and while we are busy on the water heater do not let us become so engrossed in our subject that we fail to look a little farther into the future. The adequate supply of hot water will be a determining factor in more laundry work being done in the home, while it most certainly will be a necessary appliance if we hope to add the electric sink.

#### Electric Range the Keystone

The installation of an electric range immediately puts the customer either on or within easy striking distance of our most favorable rate step. Practically all the appliances added after the range are billed on the lower step of the rate. This definitely helps establish the cheapness of electricity in the mind of the customer, the biggest job facing utilities today, and certainly the electric range is the keystone in the arch leading to public enlightenment on this point.

In attaining and maintaining higher saturation there are many factors to be considered. First of all is that of competition for the domestic cooking load from gas, sawdust and oil. Gas range promotion has steadily increased. The introduction of a "C.P." gas range with its tremendous advertising program is highly effective. The electric range, however, continues to gain upon its competitor from figures that have been released in January. In 1933 there were 15 flame-type ranges sold for every electric range, and for the first six months of 1938 this figure had been further reduced to 3.3 flame type for every electric.

Competition from sawdust and oil comes in definite cycles and invariably, through its introduction of a semi-automatic method of cooking, has reacted to the benefit of the electric range. I think here we can take a lesson from the gas industry and keep a keen eye on replacement business. If we fail to make adequate provision for a strong replacement activity, some competitor will surely arise to return the headache that we have given the gas companies. I believe that the key to this problem lies in co-operation with dealers. If we can make electric ranges a stock item with dealers rather than a specialty, we will have gone a long way toward solving our problem. When and if we accomplish this, we should not slacken up in the least but should continue our aggressive promotional work. Constant display and sales advice on electric ranges should be kept before dealer organizations.

#### Cooperation with Dealers

Tie your dealers in closely with your kitchen modernization plans. Make your kitchen planning and lighting services readily available. Help them to realize a fair net return on their range business by setting up an approved scale of trade-in values made up by a committee of dealers themselves. An adequate trade-in setup as organized in Portland, and as we instituted in our dealer organization in Vancouver, has done more than any other one thing to sell dealers the idea that the merchandising of electric ranges is a profitable undertaking.

Fostering the use of electric cooking in schools, universities and domestic science training programs is a most important work and just because electricity for cooking seems to be in the ascendency is no reason for neglecting to push it in all these institutions in your territory.

Apartment houses, the greatest of all finishing schools for brides, are doing their part to instill the idea of electric cooking in the minds of the rising generation, but therein lies the same danger as befell the gas range. Do not neglect apartment house users because you think they cannot cook in any other way. Rather give them every attention from your home service department and service department to teach them proper operating methods and keep their ranges in satisfactory working condition. We all know the obstacle in the replacement of obsolete apartment house ranges but it is a problem that we should never let drop.

The announcement this year of a three-year promotional program on electric roasters by the Modern Kitchen

Bureau is one that means a great deal in the promotion of electric cooking. These and many other factors bear on the problem of attaining and maintaining a high saturation of electric ranges. In our day to day work we should never lose sight of them.

In concluding this paper, I sincerely believe that too many utilities plan their load building programs on a hand to mouth basis rather than looking far into the future. The comptrollers, the engineers and the sales managers should co-operate in outlining the objectives for the organization for as far in advance as conditions will permit.

Plans should be laid as a result of facts that can be obtained through relatively inexpensive research work in our own territories, plus the results of information compiled by several of the more aggressive member companies of this association. Longer term planning will cut wasted effort and investment, and will increase net revenue.

## Discussion

The problem of how to reach the lower income with electric ranges was discussed, and H. R. KRUSE suggest that a satisfactory arrangement for trading in old ranges would help. A low priced range would also open the way to this market and possibly a scheme for renting ranges could be devised.

# Sales Training

By HENRY R. KRUSE
Puget Sound Power & Light Co.

A FEW hundred years ago there was a search for a universal cure, *The Fountain of Youth.* Sales training has at least one similarity to the Fountain of Youth. It has been used in an effort to cure all the ills of selling. I am referring to continuing educational programs rather than basic instruction, which is necessary before a salesman can start to sell. We must remember that continued sales instruction is necessary but that it cannot be expected to cure selling ills caused by any one of a number of things.

KRUSE

Sales training undoubtedly will prove helpful to any sales organization but we cannot expect to cure conditions caused by lack of buying power, inferior products, unsatisfactory service after products are sold, and many others.

The properly planned sales training program can be expected to do the following: (1) insure a complete knowledge of the product; (2) furnish sales personnel with first-hand information of the advantages of the product and service; (3) provide discussion of sales technique; (4) assist in determining personnel not suited to sales work.

Let us now discuss the training material and programs available.

### Correspondence and Study Courses

A great deal of good can be derived particularly if regular meetings are held and devoted to a discussion of the sales subjects being studied. Many of these courses, however, are so long that the group becomes weary and is ready for a change long before the course is completed. Only those courses which can be completed in approximately a 60-day period should be undertaken. In brief, in undertaking correspondence courses, try short ones, hold meetings and let the individuals taking the course do the talking.

Material of this kind must be based upon practical experiences if it is to be effective. It does not take a salesman very long to find out whether the course was written from actual experience or not. We will always need good correspondence and study courses and to that end we should demand material based on fact and experience.

### Films

It is truly said that "one picture is worth a thousand words." We are also told that 87½% of all impressions are gained through the eye. Both moving and slide films are most effective and offer change and variety for your sales meetings.

Our principal problem in this regard is to secure a reasonable number of good films which can be used for general sales training work. We are forced to use films made by automobile manufacturers, business machine companies and others because of a lack of effective material within our own industry. We should place credit where credit is due and say here that the gas industry, the automobile and business machine companies have developed some excellent training material and we could very well follow their example.

### Company Programs

By this I mean, sales courses developed by the company for presentation to the sales organization. If properly presented this type of training is bound to be most effective because the course meets the requirements of the individual territory and organization. However, with this type of course as with any other program, it should not be too long. Variety will stimulate interest in your whole sales program.

### Trade Magazine Articles

Reprints of timely magazine articles should be made readily available, enabling everyone to be informed as to the progress and thinking going on in the industry.

### Schools and Conferences

Occasional intensive meetings of this type are in general use. Their effectiveness depends to a great extent upon available material. Probably, the greatest good that can be derived from such meetings is the enthusiasm and optimism, absorbed as a result of close association with the subject and fellow workers.

### Sales Presentation Contest

Now we may provide all kinds of courses of study, but it is necessary that we have some means of seeing how this information is applied. After all, it is the practical application that counts and determines whether or not the courses are worth while.

One effective program of this kind is the sales presentation contest. Puget Sound Power & Light Co. has just completed one, which proved without doubt that it has considerable value. The purpose of it was to determine just what the merchandise salesmen were telling the customers. Preliminary contests were held in each district to determine which individual made the best twenty-minute sales presentation of a piece of merchandise. A "prospect" was provided who offered the usual buying objections. The winners of these preliminary contests then competed in the finals at the annual merchandise sales meeting. Cash prizes were offered to the first and second prize winners. A "prospect" was again provided who offered objections. The contest stimulated a great deal of study on the part of the merchandise salesmen and demonstrated to the men where many of their weaknesses were. Some such contest should be a part of every sales training program.

### Tools for Sales Training

How can we provide more effective tools to work with? As I have outlined previously, the principal tools which are available and being used are courses of study and films. Utility companies, manufacturers, and jobbers are all now contributing in one way or another to produce this material, while some of it comes from the E. E. I. Any way you look at it, we are producing material through at least three sources without any degree of coordination. The net result is that we have some duplication, and on the other hand, a shortage of good original educational material.

All of you who are faced with the responsibility occasionally of putting on large two or three day sales meetings, know how difficult it is to secure

anything to present which applies to our own industry. Perhaps we are somewhat to blame in this regard because in the past we have not made any united effort to express just what is needed and how it should be set up.

The Northwest is only a small part of the whole country; however, in the past we have been the principal outlet for electrical household equipment. With that experience, we should be able to correct the situation through the Northwest Electric Light and Power Assn.

I suggest a committee be appointed which shall consider the following: (1) sales study courses; (2) films; (3) miscellaneous sales information; (4) newspaper advertising copy; (5) customer folders; (6) direct mail; (7) window display material.

This committee should be formed with the view to eliminating duplication of material and should present an outline of the type and quantity of material desired. By acting as a coordinating agency, we should be able to have produced more and better material. The report of this committee, representing all utility companies, could be formulated by correspondence and then summarized for presentation to all parties concerned by mid-summer so that something could be done for 1940.

# Home Service and Dealer Cooperation

By EDITH T. RAUCH
Puget Sound Power & Light Co.

THE dealer cooperation program as it is carried on by the Home Service organization has a threefold objective to attain. This objective is to provide a service to the dealers' customers, to offer assistance to the dealers, and to promote a greater use of the utility service.

First let us consider the dealers' customer. She is materially benefited by the services that are obtained from the Home Service organization. Correct instruction on the operation of the equipment that she has purchased from the dealer will enable her to derive more satisfaction from its use. Satisfactory use of an appliance paves the way for the purchase of additional electrical appliances, and thereby brings the cost of the electric service into the lower rate bracket which is conducive to the use of more electricity for household purposes.

The educational work that is included in a dealer cooperation program prepares the dealer to make more sales of his merchandise. He is given instructions in the operation of the equipment that he has to sell, and by being familiar with its advantages, he is in a position to do a more complete selling job. He is able to offer his customers an extra service through demonstrations that often determine the closing of sales. He is assured that equipment installations will remain sold if the customer is thoroughly instructed in their use. The number of reverts to the dealer stock will be lessened.

From the standpoint of the utility, a plan of dealer cooperation by Home Service means more satisfied customers on its lines and a fuller and more diversified use of electric service as a result of the home call, during which the Home Service woman has the opportunity of interesting the customer in other electrical equipment. Through contacts made with the dealer and his customer, the Home Service organization develops more acceptance of the company, which builds that intangible asset known as good will.

A request was sent to the members of the Home Service committee for information on the dealer cooperation activity as it is being applied in their Home Service deparments. Many reports were received covering the practical applications of cooperative programs that are in successful operation at the present time. These plans include sales training classes in electric cookery for dealer sales personnel, follow-up home calls on appliance installations, cooperative cooking schools and the promotion of the light conditioning program through demonstrations and meetings held for dealer organizations.

Many utilities are finding in working with range dealers that sales training classes in electric cookery are providing a valuable means of creating enthusiasm in range sales and are resulting in an increased number of ranges being placed on their service. The plan followed in conducting this educational program is to have the dealers' ranges installed either in the utility demonstration kitchen or the dealer kitchen or auditorium.

The class is held at the convenience of the dealer, which is usually following the closing of the store in the evening. The home economist in charge plans the menu and selects the food to be cooked. Each salesperson takes an active part in the preparation under her supervision. Every step in the procedure is explained at the time and the class is instructed in the operation of all parts of the range and its sales features. This enables the salesman to have a thorough understanding of them and helps him to make more convincing sales presentations to his prospects. The classes are doing much to promote a friendly relationship between the dealer and the utility.

In many of the Home Service departments, a plan of follow-up instruction calls is being carried on successfully. The same service is given to the dealer's customers that is given to those purchasing equipment from the utility. The department is notified when the equipment is installed and an appointment made with the homemaker for a demonstration call. It has been found to be the most satisfactory arrangement to have all appointments made through the department rather than by the dealer. This practice prevents making conflicting appointments. Complaint calls on dealer ranges are promptly taken care of under this plan. The complaints are either cleared by instructions on the operation of the range or in instances where mechanical adjustments are necessary, the complaint is referred to the Service Department for correction.

GALE*

Home Service departments are frequently requested to conduct appliance demonstrations in the dealer sales rooms. Roasters, table appliances and ironers are most often featured at these demonstrations. The demonstrations are usually held on days when traffic in the stores is the heaviest. Newspaper announcements and window cards are used by many dealers to attract women to the demonstration. Occasionally an attendance prize is given to stimulate interest. Home Service women are called upon to give assistance in closing ironer sales for the dealer and to demonstrate ironers to new users.

Cooking schools are being conducted by several Home Service departments in conjunction with newspapers. Electrical dealers also cooperate by advertising in the schools. The plan that is in use by one department and is meet-

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HOME SERVICE COMMITTEE*

* Ralph E. Gale, Idaho Power Co., Chairman; B. C. Electric Railway Co., Jean Mutch; The California Oregon Power Co., Yvonne Smith; Eastern Oregon Light & Power Co., Raymond Gray; Hermiston Light & Power Co., John A. Clarke; Idaho Power Co., Helen Swanson; Incandescent Lamp Dept. General Electric Co., Walter E. Potter; The Montana Power Co., Ina Scrivner; Mountain States Power Co., Alta Simmons; Northwestern Electric Co., J. C. Plankinton; Pacific Power & Light Co., G. B. Bocarde, Audrey Herrington; Portland General Electric Co., Phoebe Gillam; Puget Sound Power & Light Co., Edith T. Rauch, Clarence Sherman; Utah Power & Light Co., Nancy Finch; The Washington Water Power Co., Mary Ann Dysart, Lucille Rameriz; Westinghouse Electric & Manufacturing Co., L. D. Pulsifer.

ing with favorable response, is to feature dealer ranges and refrigerators as well as those merchandised by the utility. The equipment is demonstrated from the platform and there is no discrimination shown in the use of either. Equal advertising is given to both by the home economist during the class. Sales of ranges and refrigerators have followed as a result of the schools. Good will toward the newspaper, the dealer, and the utility has been created as a result of this type of promotion.

Home Service representatives are working very closely with the dealers in a utility that has adopted the Electric Home and Farm Authority plan for dealers. Upon installation of all household equipment sold under this plan a notice is sent to the Home Service department and an appointment is made for a home call. During the course of the call the Home Service worker ascertains if the customer is receiving full satisfaction in using the equipment and when necessary she gives instructions on its operation. The representatives are readily received by the customers and the service is greatly appreciated both by the customer and the dealer. Through these contacts the Home Service representative has the opportunity to interest the home maker in additional appliances and also can make recommendations for lighting equipment.

**Kitchen Planning Service**

One committee member reports that the dealers are especially encouraged to interest their customers in taking advantage of the kitchen planning service which is a function of the Home Service department. Home Service women are often asked for advice in kitchen arrangement, the selection of floor coverings, cabinets, etc. Because of their knowledge of the subject they are called upon to give this advice and to recommend dealers selling the equipment needed.

In the promotion of the national Better Light—Better Sight activity, considerable educational work has been done by Home Service departments among dealers. Meetings have been held and the light conditioning program presented to their personnel. Talks on the Science of Seeing, educational and sales films have been used to create interest and enthusiasm of the dealer staff to promote this activity and participate in its benefits. Sales training material has been supplied to the dealers in the territory served by several utilities, which will equip the sales people to recommend the proper size lamp for every socket as well as suggesting various types of lighting throughout the home. Personal instruction in Home Lighting have been given to individuals in addition to the instruction classes.

THE HOME SERVICE GIRLS GROUP: Front row, left to right—Thelma Brown, Portland G. E.; Mary Ann Dysart, Wash. Water Power Co.; Harriette Sergeant, Northwestern; Audrey Herrington, P. P. & L.; Ina Scrivner, Mont. Power. Back row, left to right—Edith Rauch, Puget Sound; Jean Mutch, B. C. Electric Ry.; Mildred Elrod, Northwestern Electric; Lucile Ramirez, Wash. Water Power Co., and Helen Swanson, Idaho Power

Each year during the annual dealer I. E. S. promotional program of one utility, the Home Service staff has actively engaged in the campaign by contacting the various dealers in the territory, explaining the campaign and interesting them in the window display contest which is used as a curtain raiser for the program and for which there is a substantial fund provided in cash prizes. They further assist the dealers by distributing promotional literature to them, aiding them in their floor arrangement, and window displays. Small but appropriate lamp sales report forms addressed to the Home Service representative were furnished the dealers and called for personally by the representative.

The cooperation of the dealers was increased and more of a personal interest in the program was taken by them when they were advised that the Home Service representatives were also competing for small cash prizes, dependent upon the volume of dealer sales. Prospective lamp customers were called upon and interviewed by the representatives at the request of the dealers. Spot announcements over the radio in the interest of the light conditioning movement as well as talks and dramatizations given over home service broadcasts featuring the necessity of adequate lighting and how to obtain it, have contributed their support to increased sales of the good lighting fixtures and lamps.

In some utilities the practice of inviting lamp dealers and sales people in department store lamp sections to attend training classes which are held for the Home Service staff, are proving to be an excellent method of interesting this group in light conditioning and the selling of correct lighting equipment.

The many possibilities that are available through cooperation between the Home Service department and the dealer not only strengthens the bond of good will, but to the dealer customer it means increased appliance satisfaction; for the dealer it creates satisfied users and more sales; and for the utility it brings an appreciation of its services.

# Light Conditioning In the Home

By WALTER E. POTTER
Incandescent Lamp Dept. of General Electric Co.

LIGHTING for beauty and decoration joins forces with light for seeing in widening the possibilities for increased revenues from the great home market. The promotion of the use of more lighting in the home has expanded into an intensified light conditioning movement.

POTTER

Light conditioning, as a practical sales idea, represents a decided improvement in lighting sales technique. Even though lighting is the oldest utility service, it still offers the greatest possibilities for the future growth

of the industryy. This is shown by an excerpt from a talk by Dr. M. Luckiesh, which indicates the breadth and scope of the market for residential lighting service:

> "Today the light conditioning of a home of this size in accordance with science and seeing requirements would involve a connected load of 5700 watts with an estimated consumption of 1300 kw.-hr. per year. Over 1924 practice, this would mean a 300 per cent increase in lamp bulbs, and a 60 per cent increase in watts per bulb and a 500 per cent increase in kw.-hr. from lighting."

During the five years of the Better Light—Better Sight program, the development has progressed through five distinct steps: national organization, national promotion, merchandise sales technique, specialty selling, and dealer selling. Need for the first four of these phases is still as great in 1939 as in previous years. The growing importance of the fifth step demands comprehensive, well-organized, long-range programs for all dealer outlets. The contributions of utilities and manufacturers to the national campaign will not be amply repaid in additional compensatory revenue and more lamp bulb and lamp equipment sales unless there follows a marked improvement in the "point-of-sale" transaction.

One major key to the situation facing the forward progress of selling light for seeing, for comfort and for decoration in the home is wattage of lamps. With utilities selling less than one out of every four lamps purchased for home use, it is necessary that dealer outlets be strengthened and that they (1) understand the sales possibilities of better light; (2) want to render a reasonable and adequate lighting service to their customers; (3) understand the basic fundamentals of light for seeing; (4) carry an adequate stock of larger size lamp bulbs; and (5) recommend the right wattage for each lighting use.

There are so many uses of lighting in the home—the possibilities are so great—that in order to get a comprehensive understanding of the situation it is necessary to examine the possibilities room by room. Watts installed and kw.-hr. used for lighting of each room of a six room house before and after light conditioning are indicated in Table I.

Table I emphasizes the amazing gap that exists between the ordinary, non-light conditioned home, and what is today accepted as the light conditioned home. It is a striking reminder of the extent of the unsold home lighting market that exists even today, and each year brings additional increases in lighting standards which tend to extend the market.

**Table I**

| Home Lighting Application | Before Light Conditioning Watts Connected | Before Light Conditioning Kw.-Hr. Per Year | After Light Conditioning Watts Connected | After Light Conditioning Per Year Kw.-Hr. |
|---|---|---|---|---|
| Exterior | 50 | 10 | 300 | 20 |
| Living Room | 250 | 115 | 1,260 | 350 |
| Dining Room | 100 | 35 | 120 | 40 |
| Kitchen | 75 | 35 | 440 | 100 |
| Bedrooms (3) | 375 | 75 | 1,780 | 370 |
| Bath | 50 | 10 | 130 | 50 |
| Miscellaneous | 125 | 20 | 970 | 70 |
| Total | 1,025 | 300 | 5,000 | 1,000 |

The utilities represented in this association offer electric service to over 750,000 residential customers and in addition service 150,000 farm customers, all of whom are definitely in the market for improved lighting. With a large number of these customers in the low income brackets, we must find some method of reaching them with equipment which will make a definite start towards light conditioning.

An inexpensive I. E. S. table or floor lamp plus a medium-priced ceiling fixture can be offered as part of a package lighting unit. Several manufacturers during the past year have provided packaged lighting equipment available in three price ranges which have proven excellent both for rural line extensions as well as present low income bracket customers in urban areas.

Aside from the problem of paying for new lighting equipment comes the universal headache of bad wiring. Even if we sell all the needed lighting, how can we install it when there is not one convenience outlet in the house? The best answer is some cooperative set-up between the utility and the electrical contractor by which standard convenience outlets may be installed at a price and on terms within the financial abilities of the customer.

In modest homes the problem of health has always been much neglected. With a very limited income, no one in the family can afford to cater to the many health whims and so it is too much to expect this person to be alarmed into making immediate improvements simply by telling her good light is necessary for better sight. With this home of modest income, there is little left after the grocer, the butcher and the candlestick maker have been paid, and after all, we are in keen competition with other demands for this small amount to be spent for the comfort and happiness of the family. We should not hope or attempt to sell this person a complete lighting job, but at least we can install one or two low-priced units at a time, assuring her that in the end the same effect will be accomplished.

However, a majority of the homes now being called on by utility home service advisers are of the better income group using major appliances who can well afford to light condition their homes. To handle this type of home efficiently requires that an advisor become thoroughly familiar with light conditioning in its entirety. She should have an idea of art and decoration, together with the knowledge of combining lighting equipment and home decoration. To accomplish this end requires just as complete training as is necessary for appliance service work.

### Necessity of Study

The chief objection from the interior decorator and the modern housewife today is the lack of knowledge and application shown by the average home service advisor in the decoration, design and use of better lighting equipment. It is time that study was given to this phase of operating of the utility home service advisor.

Many new lighting sources and much lighting equipment have been brought on the market in the recent months. Manufacturers of I. E. S. lamps have broadened their lines most extensively. Blue ribbon I. E. S. lamps especially designed to fit the modern decorators' schemes for various furniture periods are available in a wide range of prices.

The new fluorescent lamp, made in tubular shape in 15, 20, 30 and 40-watt sizes with its higher efficiency cold light, offers new possibilities in the design of residential lighting equipment. One manufacturer has shown in this territory a new line of portable lamps which are acceptable as Better Sight lamps, using an oval shape. Lighting efficiency and decoration have again been combined to give the home service advisor new tools to work with.

Lighting fixture manufacturers have designed new lighting fixtures combining the features of light conditioning. These provide sufficient light for safer, easier seeing; lighting free from glare; lighting which eliminates sharp contrasts; and lastly suitable light in enough places.

The silver bowl lamp now available offers an opportunity to convert the

Ted Bakeman addresses the Lighting Committee

standard shower fixture into a good lighting unit. Small collars can be attached to these silver bowl lamps which eliminate the glare and provide good indirect lighting inexpensively. Adaptor shades for bridge lamps using silver bowl lamps are available, together with many new lines offering diffusing bowl units for attaching to the wall.

To direct customers to dealer stores that understand the fundamentals of light conditioning and that stock the merchandise required, has been very difficult. General Electric Co., recognizing this situation, has taken action through its dealer light conditioning program, by selecting dealers in most communities who are aggressive and best equipped to render light conditioning service and providing them with training material.

**General Electric Guide**

These stores are first given a copy of the new General Electric light conditioning guide and training in how to use it. The guide tells of the benefits, fundamentals and low cost of light conditioning. It specifies the type and size of Mazda lamps that will give the best results in each kind of portable lamp and fixture. It suggests the proper use of each kind of floor lamp and it shows popular types of shades and adaptors for modernizing existing sockets. It is an asset to the home service advisor to have stores functioning like this in her community. But it is not an overnight job to establish all these dealers. Therefore, for the benefit of the home service advisor and the customer, the advisor should become (1) familiar with this training dealer service; (2) call on these dealers assisting in training and help them to select and display the right merchandise; (3) encourage them to use the guide and supply them with information on local rates which is needed in low cost sections; and (4) offer to represent them and call in the homes of any of their customers who express a desire for light conditioning.

It is assumed that all home service advisors would carry a copy of the light conditioning guide with them on their customer calls and be familiar with the material needed to render complete service to the customer. In addition, all sales people in utility stores should study the training material and be prepared to assist the home service department in correct recommendations to the customer.

# Home Service and Light Conditioning

By MARY ANN DYSART
The Washington Water Power Co.

THERE are approximately 29,904,663 families living in the United States, according to the 1930 census. About 800,000 to 1,000,000 of these families a year are now being introduced to better lighting in their homes. This brings us to a present average rate of coverage of once in 22-27 years. Realizing this fact, would you be willing to allow any of your customers to wait twenty years to hear the story of Better Light for Better Sight? Would you be willing to set aside the light conditioning in your home for twenty years? Certainly, there is a future to this home lighting activity. Some companies already are operating on a basis of coverage once in every three years. The results in these communities are such that even indifferent customers are unconsciously influenced to change to better lighting by seeing so many examples all around them.

The potential lighting market is far from saturation, not only in lamp sales but in kw.-hr. consumption. In a recent market survey for I. E. S. lamps, there was shown that in every home there are approximately ten places where 25 foot candles or more are needed. Half of these may be taken care of by I. E. S. lamps. With cumulative sales of 600,000 in 1934; 2,000,000 in 1935; 4,200,000 in 1936; 6,400,000 in 1937; 8,200,000 in 1938; to 100,000,000 in the future market, we are a little over the 8 per cent mark of potential lamp sales.

**Increase Advisers**

If the 900,000 families—750,000 urban and 150,000 farm—served by the companies represented in the Northwest association, were allotted in groups of 3,000 per adviser, it would take 300 advisers making 1,000 calls each a year three years to cover the territory. Compare these figures with the number of advisers there are to serve these customers, and with the number of calls your advisers each make each year. We are far from even this goal. Where the home service work is on an all-service basis, half of the adviser's time is devoted to appliance work, and it has been found that to do a nearly adequate home service and lighting job, the number of advisers should be increased 50 per cent to maintain one adviser to 3,000 accounts and have a coverage of one call in three years.

A controversial subject is whether the home service adviser should sell or not sell lighting equipment. Of the 92 companies before mentioned, 44 are merchandising directly and 48 are not merchandising directly. The important factor in this part of the work however is to make it easy for Mrs. Homemaker to buy *now*.

There are certain problems in having the advisers do direct selling. One of the most important of these—that of having the adviser try to sell merchandise on a service call—causes the customer to be wary of having another "service" call. In many cases this has closed the door for future calls. There is more often discord than harmony between advisers and salesmen when the advisers are required to sell. Although direct selling is a quick way to install equipment, it would seem that for long time satisfaction of customer, and opportunity for adviser to perform greater service, a better plan would be to have a planned follow-up by salesmen or dealer. It is also important for the adviser, salesman and dealer to have similar training in home lighting if this plan is to be successful.

One of the most effective ways of promoting our home lighting service is through group meetings, exhibits and public gatherings. This year one new

plan is a "Ball Lighting Style Show" to interest the public in light conditioning.

In planning the ball lighting style shows there is an opportunity to popularize an interest in home improvement in other rooms of the house beside the kitchen. Dealers handling furniture, draperies, lamps, fixtures, wiring devices, and other home supplies could be invited to exhibit.

**Home Demonstrations**

A complete lighting program could be presented in the afternoon for the home economics students and other girls, mothers and teachers, and in the evening for the ladies who wish to bring their husbands. Science of seeing demonstrations could be shown to point out the need for better light. Parts of the home lighting kit demonstration should be shown to demonstrate how these facts relate to the lighting in the home. Sound slide films or slides could illustrate how changes can be effected in the home lighting. And finally new equipment and adaptor units could be demonstrated to show the actual units which are recommended for correct lighting.

Each dealer could be invited to display a complete line of his fall I. E. S. lamp stock. Furniture groupings could either be displayed or discussed to bring out the correct use of each model of I. E. S. lamp. New fall colors in draperies, rugs and furnishings should be displayed and suggestions for their correct use be made, and several window treatments, including one with an actual demonstration of a lighted lambrequin unit, are recommended.

Employee education should be an important part of every home service light conditioning activity. Every contact of any employee is a sales contact. His friends expect him to know what is going on in his company and it is his responsibility to know at least some of the activities sponsored by the sales department as well as company policies. There is an excellent opportunity for an employee to carry information to his friends about lighting, for evenings are usually when he meets his friends. If he entertains them in his own correctly lighted home, an impression will be made upon them by the lighting whether it is discussed or not.

A few well planned lighting programs presented during company time are an investment well worth the consideration of every electric utility. Actual lighting in a living room interior showing the correct use of the various models of I. E. S. lamps, science of seeing demonstrations proving the need for adequate lighting and sound-slide films showing home interiors correctly lighted will encourage employee interest in Better Light for Better Sight. These meetings should be followed by a kit demonstration in the home whereever requested. Also employees may arrange for demonstrations or programs on lighting for their friends.

Lighting sales classes were planned to meet the dealer's needs and interests in home lighting in one city recently. The opportunity for a group of lighting dealers to meet and informally exchange ideas and problems was stimulating to all. When the discussion was not easily forthcoming from the group a question-answer contest started the evening easily. Each person was invited to write down his most difficult question on lighting. These questions were then drawn from a hat and many fundamental and worthwhile lighting problems were opened for discussion. More often than not several different answers were offered for each question. Two meetings were held with an attendance of 80 dealers. Science of seeing, merchandising, rates, kit demonstration and home service pamphlets and salesmen's

MERILEES MADISON McALLISTER

selling tips were included on the program.

The opportunity for telling the story of light in the schools is an annual activity. Each year the scene changes and there is a new group ready for program material. For the seventh and eighth grades the sight saving project including four charts, teacher's manual and pamphlet, "The New Story of Light" published by the General Electric Co., has been extensively used. Over 18,000 of these charts have been distributed throughout the U. S. One company in the Northwest now has 175 of the projects in process.

Sound slide films also have been widely accepted for school use and in one company 223 school programs have been presented to 18,723 students already this school year.

Projects of special interest to home economics girls for class or club projects have been used. Using mother's living room floor plan as an actual case, relighting was completely planned by one home economics club. Each girl made up a book of lighting and decorative suggestions which she wished to work out. Prices of material were included in the study and actual color samples and illustrations of furniture were sketched. Another group planned the lighting and decorations for their own rooms at home. For the two most outstanding books I. E. S. lamps were given as prizes.

Details are available for manual arts classes for boys to make up I. E. S. lamps in their shops. This project has a lasting benefit by providing a very necessary lighting item for the boy and his family at a low cost.

# Kitchen Modernization

By F. H. HARRIGAN
Modern Kitchen Bureau

NOWHERE is the value of modern electrical appliances more emphasized than in the kitchen. Today electricity in the kitchen preserves the food, cooks the meals, washes the dishes, disposes of garbage and performs many other household tasks. The modern kitchen is designed not only to eliminate labor but to save steps. Scientifically arranged, it is a combination of cooking laboratory and livable space.

In addition to modern equipment, a well planned kitchen should have adequate wall space. There should be as few doors as possible in the kitchen. For a house of from four to eight rooms, with no more than one servant, a storage pantry is entirely obsolete. It takes valuable space from the house, increases the number of doors and adds nothing of real value to the kitchen.

All kitchen equipment should be built-in so as to avoid unnecessary dirt pockets. Major pieces of equipment should be so placed in conjunction with each other that the preparation and cooking is accomplished with a minimum of labor and steps. Kitchen operations are arranged in this normal sequence: receiving supplies, storing supplies in cabinet or refrigerator, preparing and storing foods, cooking and serving. Kitchen equipment should be organized into work centers to perform these functions efficiently.

The electric appliance is no longer looked upon as a luxury, but rather as a necessity. Owners find that the elec-

tric refrigerator is an investment that saves money, since the housewife can buy perishables in quantities on food bargain days and get the benefit of lower prices on larger purchases. It also is recognized as a necessity in keeping foodstuffs in wholesome condition.

More and more people are installing electric ranges in their kitchens. The modern range is speedy and economical, and includes the many other wonderful advantages that you are all so familiar with.

Thus far, doctors represent the largest single group of electric dishwasher users, as physicians realize that electric dishwashers have much to do with preventing the spread of communicable diseases. It has been determined that at least 20 per cent of disease organisms adhere to eating and drinking utensils which are washed and dried by a towel. Medical authorities say that approximately 90 per cent of all communicable diseases are carried in the saliva-borne and food-borne infections from eating utensils. Mechanical dishwashing eliminates this danger.

The disposal unit, the roaster, the mixer, the toaster and other appliances are today receiving splendid acceptance and have truly taken drudgery out of the home office.

You, of the home service department are in position to play the leading role in developing these dream kitchens in the homes in your respective territories. You have spent time, money, and effort in preparing yourselves for this, your vocation. Your companies make available for you, every possible means of training and materials, so that you may keep abreast of the times. You are the home specialist; your customers have implicit faith in you; your suggestions are welcomed and valued. You are the logical ones to sell efficiency and charm in the kitchen—to make this the most attractive and popular room in the home.

**Efficiency in Home**

Efficiency comes through modern automatic electrical equipment, designed to do specific tasks with precision and economy. It comes from proper arrangement of these appliances with cabinets and work counter. It comes through modern lighting, through washable wall and floor coverings, through stainless metals and resistant enamels, which are easily cleaned.

Charm in the kitchen is the quality that makes its owner want to show it to her friends, that makes her enjoy just being in it every day. The texture and color of walls and floor coverings does much to make the kitchen attractive. More important in making this room one of charm is modern electrical equipment, as beautiful in design as it is useful and efficient in operation.

Through women's magazines, local newspapers and your good work, the housewives in your cities have become familiar with the step-saving all electric kitchen. Through continued efforts such as these, especially through the efforts of you in our home service departments, the gospel of all electric kitchens is being spread.

# Coordinating Sales and Home Service Work

By NANCY FINCH
Utah Power & Light Co.

ORIGINALLY the women in this work were known as demonstrators, and their work was limited entirely to promotional schools, calls on new ranges and trouble calls on ranges. Then "lighting advisors" were brought into the picture to give lighting demonstrations to residential customers and to encourage people to buy the modern equipment to complete the recommendations made. Soon most utilities realized that departments were over-weight in number of advisors doing specialized jobs, with a tremendous overlapping of those who were calling for lighting and those who were calling for appliance purposes. So the two types of work were combined and the general "Home Service Advisor" was born, but still assumed to work almost exclusively in the field of residential sales.

Occasionally we were called upon to help on a manufacturer's program to demonstrate the use of his products. Newspaper cooking schools were not new to us and they were continued, and a lecture or demonstration for a church or school group would creep into our program now and again. Lighting increased our contacts and spread our possibilities for group meetings, and then suddenly we were in the midst of a great program combining activities for all divisions of our sales organizations.

*Advertising* — Basically any home service group is a major part of the advertising and sales promotional work done in a utility. All group meetings given for the purposes of demonstrating electrical appliances are given with the major thought of creating in the minds of the audience a desire to own such equipment. Such appliance schools are visual advertising of desirable merchandise; prospect schools might be called the visual follow-up advertising for really interested women; schools for new users have the double value of the follow-up that will re-sell the woman on her newly purchased equipment and continue to build in her mind the desire for additional equipment.

Radio programs under the direction of the home service group will carry this same type of advertising in dramatic form to many women who can not attend group meetings. Such advertising, as we all know, goes right into a home while a woman is doing her own housework and reminds her of the many conveniences which she does not have and the many which she does have to make her day easier.

Many home service advisors are writing weekly articles on cooking, laundry work, or other similar subjects for local papers, and many of them write such articles for church, school or home economics publications less frequently. But all of these activities are planned to advertise the service of our advisors and our companies.

*Dealer Cooperation*—Commercially, perhaps this is the most important field in which the home service advisors can give help, because dealers do need help. The home service advisors can help to give the product story, use and service story, and to sell the idea of electricity for all home appliances at jobbers' and distributors' meetings. More than that, we can help to train dealer salesmen in the use of all the electric equipment they handle, help to train them in how to sell such equipment, and call on the prospects in homes to close sales by the demonstration of a dealer's appliance.

Dealer activities can be handled in various ways. In localities where there is only one advisor, she can handle dealer problems just as she handles company problems; give training schools for salesmen, do group and sales floor demonstrations for the dealer store, call on new users to give further education on use, and call on prospects to help sell them dealer merchandise. All of this she must do by making regular calls on the dealers in her territory so that she can keep familiar with his merchandise and with his problems and so that his confidence in her will continually increase.

In territories where there are two or more advisors, the work with dealers can be divided so that each one has a definite group of dealers with which to work. In more compact territories, such as the larger cities, either each advisor may take her share of dealer

work, or the entire dealer contact program may be given to one advisor.

*Government and Municipal*—Under this class of service, the home service advisors can really do a splendid job of cooperation in improving the condition and class work of all home making classes by giving instruction in kitchen and laundry equipment, sewing electrically and good lighting. In fact good lighting can be given as education for the entire student body of any school, and can go a long ways in inducing our school boards to make improvements in school lighting, as well as in other kinds of equipment.

The home service advisor can give help to home economics teachers by way of more modern methods with better equipment, either by demonstration or by lending small equipment, and by helping on programs which tax the school facilities such as banquets and other social gatherings.

When home economics departments are to be newly built or to be remodeled the home service advisors can give invaluable aid in planning purchase and placement of equipment. This makes a fine opportunity to talk and teach good kitchen planning. Such departments are being used to train girls in future homemaking and are to be used often by the public for community gatherings, and whatever work is done there is done by girls or women. The help of an advisor in planning those rooms is needed because she has, or should have, knowledge of the activities which will go on there and she can help to make such activities less burdensome by the good arrangement of equipment. The home service advisor should be used by the teacher, the principal, the superintendent and the government and municipal salesman to sell the public and the board of education on good lighting and up-to-date homemaking departments.

In some cases it will be justified to use just one home service advisor in a large city, to spend a definite part of her time working with the government and municipal salesman on just such school work.

*Commercial* — Perhaps the biggest job which the home service advisor can do in the commercial department generally is to work with the commercial salesmen to give education to church groups and to sell church organizations on the idea of better lighting and improved kitchens. Nearly every church has a kitchen where women are expected to prepare everything from refreshments to banquets. The advisor can hold group meetings with these women and demonstrate for them the tion of electric ranges increases, the advantages of electric cooking, good lighting, and well-planned kitchens for easier work. We can lend small appliances for special church functions and sometimes lend ranges which are in the service department for reselling.

The home service advisors can be used to demonstrate small commercial equipment, fry kettles, grills, and small commercial ranges. In some roadside stands and in tea-rooms the advisor can help to sell good lighting, mixers, dishwashers and often portable roasters where they will do a job of meat roasting, making soup, roasting pine nuts or just keeping foods hot. Advisors can also be used to demonstrate this commercial equipment for the dealers or jobbers who handle it.

In all of this work, however, the advisor should never work without the knowledge and complete approval of the commercial salesmen.

*Farm Electrification*—In most cases, for the advisor, the help given in selling farm equipment will simply be an extension of her residential work, because she will be chiefly concerned with the electric services which are needed by farm women: running water, hot water, refrigeration, ranges, cream separators, chicken, turkey or pig brooders, drinking water warmers, yard lighting, coop lighting, soil heating for starting vegetable plants for transplanting, laundry equipment, good indoor lighting, and all other uses and services for jobs in which the farm woman may be active. Possible connections on planned new extensions should be contacted early by the advisor to insure good lighting, adequate outlets, and equipment installation.

All of these cooperative sales activities are essential to the operation of a good sales department, but home service advisors must also continue to do a complete job in residential sales, assist on campaigns and education; develop prospects, develop desire for adequate wiring, good home lighting, all-electric kitchens, and all electric homes. In fact there is no reason why home service should not become general sales service, since about 88 per cent of all sales are made to women in all sales fields.

# Home Service Value

By PHOEBE G. GILLAM
Portland General Electric Co.

THE SUBJECT we wish to discuss indicates a far cry from the dim past when a home service department had only one function, that being to tell a new purchaser of an electric range how to operate the "new-fangled" device which had just been installed in her kitchen to take the place of a gas or wood range on the full-time job of cooking two or three meals a day for, often, a critical family.

*Amusing Incidents Occurred* — In some ways those were the happy days. Requests for assistance from new users of electric ranges often contained more humor than headaches. The customer's appreciation of the assistance we were able to give her was always a stimulus to give even better service.

*Misunderstandings not so Prevalent Today* — Every home service worker probably knows many humorous situations in which misinformation as to the use of their new appliances has led customers to unusual results. However, we can expect less and less of these misunderstandings in the use of electrical equipment, particularly ranges, because the general public is becoming more familiar with the equipment.

*Home Service Work Adjusted to Meet Needs*—It has been the experience of our company that as the saturafunction of a home service department must necessarily be adjusted to the changing conditions which confront it. It becomes less necessary to educate individual users in the proper use of equipment because of their absorption of this knowledge from neighbors, relatives, and friends who have used electric ranges over a considerable period of time, or because they, themselves, have had electric ranges before.

Consequently, new user classes are held in our kitchen at 2 o'clock on Wednesday of each week. To them are invited all customers who have made recent purchases of electric ranges. It is an accepted fact among sales people that the greatest enthusiasm a new user develops for the electric range will be displayed during the first few weeks of use. If she has been properly sold on its merits, she will become an important factor in convincing her friends and neighbors who have not yet been won over to the advantages of electric cookery.

*New User Classes Offer Sales Opportunity*—Also, since electric ranges are being sold in greater volume than in days gone by it is more feasible to give group instruction in regularly scheduled classes conducted in the utility's display kitchen than to make individual home contacts whether or not such contacts have been requested by the customer. These class demonstrations offer the opportunity of demonstrating other appliances such as the dishwasher, refrigerator, mixmaster, water heater, and miscellaneous electrical gadgets which compose a com-

pletely modern electric kitchen. This brings the work of the home service department into the sales promotional field, for selling both electrical equipment and kitchen planning.

*Electric Cookery Is Standardized*—The increasing recognition of electricity as a cooking medium and the standardization of cooking equipment eliminate the necessity of demonstrating the particular make of range that the customer has purchased. It also makes possible the use of the demonstration class as a sales tool to sell the advantages of electric cooking and complete electric use to prospects at the same time the new user, herself, is acquiring confidence in her new purchase.

*Prospect Classes Are Important*—In connection with prospect classes, let me mention the work we have done in demonstrating electric cookery to "teen-age" youngsters from the home economics classes of both our public and private schools. The children are transported from their schools to our electric kitchen in our company's special buses without charge. Such service and demonstrations are deemed of value since it should be remembered that the school children of today are the citizens of tomorrow. They will make good prospects for future sales of electrical equipment.

*Individual Home Calls Still Needed*—In addition to our classes, it is still necessary, in some cases, to make individual home calls on customers who are having difficulties in securing the results anticipated from new or old equipment. Such calls are negligible, but we shall always have with us the "obstinate" customer who insists on using her electric range *exactly* like she used her old gas or wood range. Then, there is always the little bride who needs all the culinary help a home service worker can give her.

*Dealer-Salesmen Get Attention*—In spite of the brides and the "stubborn" customers, the new user classes do eliminate most of the home contacts, and thus make it possible to give more time and thought to assisting the electrical dealer and his salesmen sell more equipment, and sell it well. We give the dealer salesmen the same kind of class instruction we give in the new user classes, working in more selling detail to educate them in presenting a better sales story to their prospects.

Our dealer promotion representatives arrange for these dealer salesmen classes. Groups of twelve men attend the classes, which are held at 5:30 in the evening in our electric kitchen. In presenting the demonstration, each salesman is given a folder entitled, "Selling Electric Cooking." This is our text, and from it we endeavor to educate the dealer salesmen in the use of the electric range and cooking terms. The salesmen are given a chance to convince themselves of the superiority of electric cookery over other methods.

Before their very eyes a dinner is prepared to prove by action the advantages of electric cooking. We strive to prove that electric cookery is fast, clean, and saves money. Since the "proof of the pudding is the eating," the men eat the dinner they have seen prepared. The salesmen say, after these advantage-proof-action meetings, that they can interest prospects easier and keep them interested.

*Training of Dealer-Salesmen is Important*—In the past the dealer salesmen have relied upon utility sales people to do this type of sales development in the field, and have been content to sit by until the prospect was developed to the shopping stage that would enable them to talk to the prospect on their closing offers and inducements. Now, however, since electric utilities of Portland have gone out of the appliance-selling field, the sales personnel of dealer organizations, if it is to be a factor in the rapid acquisition of new revenue, must be equipped with the same knowledge and enthusiasm that marked the former utility representatives engaged in similar work. To this end, the home service department gives valuable information to the dealer salesmen to aid them in selling their prospects.

Our home service work today is made up of three functions: (1) individual customer contacts in the home; (2) new user and prospect classes, and (3) dealer salesmen classes. It has been proven that a satisfied electric equipment user will come back for more electrical appliances and encourage her friends in the purchase of them. It has also been proven that properly-trained salesmen can do a better job of selling electrical equipment. And, we all know that the more electrical equipment sold, the greater the load accruing to the utility.

The home service department is a proven authoritative source on which the dealers, the dealers' salesmen and the customers may call whenever they need assistance with their sales or electric cookery problems.

# What Can Home Service Do for the Utility?

By E. R. WOOLLEY
Ebasco Services, Inc.

IN DISCUSSING this subject I would like to call to your attention that my remarks here are based upon the experience of the companies with which I am associated. The place of home service in the utility is in the sales department, under the residential sales division, and being a part of the sales department, home service planning, promotion, advertising and sales training is the responsibility of the sales promotion and advertising division.

*The Broad Utility Market Is in the Home*—In our companies we find that eight out of ten customers are in the residential and farm group. These customers are located in many scattered communities, under different living conditions and with a wide range of tastes and habits. The revenue from these customers represents approximately one-third of the total general business revenues of our companies. The wide variety of services that are and can be used by these customers include lighting, refrigeration, heating, cooking, health and labor saving applications and the like.

Statisticians inform us that over 85 per cent of the purchases made throughout the country for homes are influenced or made by women and the bulk of revenue comes from the homes over which they preside.

*Home Service Paves the Way for Sales*—The broad scope of home service promotional work, directed toward the mass market, embraces many types of activities. By shaping and guiding the thinking of present and future customers, Home Service sows the seeds of desire in their minds so that less effort, time and expense are involved in the final selling of energy-using devices by company and dealer salesmen.

*Home Service Sells Through Teaching*—Home service fills the role of teaching present and future homemakers, by shaping and guiding their thinking, by changing their habits and modes of living, by sowing the seeds of desire for better living through the fullest use of utility service. Such desire is developed through continuously showing how to groups, as well as by individual contacts. Home Service educates and promotes by face to face contact.

*Home Service Can Prevent Load Mortality*—From the customer's viewpoint, the advantages of home service can be found in the more efficient and economical use of the present equipment and a thorough appreciation and understanding of the value and cheapness of utility's service.

In following complaint calls, either upon direct request of the customer or at the request of dealers' or company salesmen, home service has proved its value in retaining present users by instructing women how to overcome operating difficulties. Idle appliances are restored to active use. Frequently service men or salesmen have exhausted their efforts in trying to rectify complaints of users. Appliances may be adjusted properly from a mechanical standpoint, but the customer is not satisfied because her problems are not understood by salesmen or service men. Home service renders the necessary assistance, satisfies the user and assures the use of present equipment.

*Home Service Keeps the Customer Sold*—One of the fundamental principles of home service activities is keeping customers sold on the service they are using. Neglected appliances go out of use because of disrepair or obsolescence, and neglected customers are easy prey for competitors, both those seeking to turn the housewife's utility dollars into totally different channels and, worse yet, those deliberately striving to divert such dollars to purchase of directly competitive substitute services.

### Basic Requirements for Successful Operation

*Demonstrations and Lectures* — In reaching the homemakers of the community and teaching them the value and benefits of using utility's services, home service plans and conducts activities which will secure the greatest customer acceptance and use of utilizing equipment in the shortest possible time. In order to approach and teach the greatest number of customers with the least expense, home service properly takes full advantage of group demonstrations and lectures.

*Public Groups*—Probably one of the oldest activities of home service is the public group demonstration, which has recently been made more effective by giving it greater sales emphasis. Rather than being just a "cooking school of the usual recipe variety," the public lecture-demonstration of today uses appliances and other equipment to prove that the utility's service is easy to use, is practicable, efficient and gives value to the homemaker far beyond the small cost to buy and operate.

One of the objectives of a public lecture-demonstration is to reach the largest possible percentage of customers. Such activities require most careful planning so that the program is varied to secure the interest of the entire group and stresses as many residential service applications as possible. Making the fullest use of that audience to convey the story of the bargain in the utility's service for performing its many uses in each individual's home is a job that requires the fullest use of a dramatic, humanized approach that convinces and sells.

*Small Group Demonstrations and Lectures* — Undoubtedly small group demonstrations and lectures have done much to create a reputation and a demand for home service work. They constitute one of the progressive methods used by utility companies in the promotion of use and value of their service. To be most effective, small group demonstrations and lectures should be made by appointment only in order that the work may be planned in order to consume a minimum of time. Clubs and associations are usually eager to secure a place to meet and this affords a splendid opportunity for home service to combine either a lecture or demonstration with regular club activities. Parent-Teacher organizations, community or neighborhood groups also are receptive to this type of meeting and give home service another opportunity to sell use and value of service.

*Dealer and Company Store Demonstrations*—Sales floor demonstrations conducted by home service are effective in increasing the use of utility service. A preliminary step for successful results is to give a demonstration to company and dealer salesmen, who after seeing, smelling and tasting the finished products, will pass their enthusiasm on to prospects and invite them to attend the demonstration. Informal invitations and window displays will arouse the interest of customers.

Fundamentally, the dealer is in business to make money. For this reason, any guidance that home service can give and anything it can do to improve the dealer's business, is good business. This is especially true of the small town or rural community dealer.

*Customer Contacts*—Among the projects, which have been developed by home service and brought to a high state of value is the home call. Such contacts, if systematized, have a definite promotional value to the company and to the dealer and an important economical value to customers.

*Every Call a Sales Call*—Furnishing extensive free consulting service to a customer without selling something is neither desirable nor essential. Equally important is the ability to distinguish between "visiting and selling." Every home service representative should be alert to observe ways and means of getting more service used on every home call that is made.

In order to make "Every call a sales call," it must be thought out and planned in advance.

*Home Calls*—Home calls deserve prompt attention and very careful treatment. The requests received by the home service department may originate from many sources and the nature of the calls may vary as widely as the territory in which they are located. A definite assignment of territory to each home service representative and a daily plan for following home calls is essential.

To be certain that the homemaker, dealer and the utility receive full value from each home call, reference to a check list by the home service representative should be made before completing the call. More satisfactory results can be obtained when more than one service is explained.

*Follow-Up Sales Requiring Special Attention* — Follow-up home calls to customers, originating from new appliance sales, return calls following previous visits or as a result of complaints embodying sales implications, frequently require special instruction to customers. Such calls are a particular function of home service, not only inherent in the promotional aspects of the home service program as a whole, but as back-up support or special assistance to company and dealer direct sales force when needed.

*Answer Request Calls for Specific Assistance*—In the every-day routine of home service, numerous request calls of a sales nature are received. These calls may involve many different phases of home service work. While much of this information can be given over the telephone, it is desirable in most cases to call and see the customer. These calls are timely and the very fact that the customer requests them shows that she is in a receptive mood, has confidence in home service, and is open to suggestions. The home service representative should take full advantage of these calls to sell the use and value of all service.

*Kitchen Planning*—The relation of kitchen planning to home service activities should follow promotional lines in harmony with the general nature of all home service work. The kitchen plays a relatively important part in family life and presents unusual sales opportunities. This is evidenced by the national and local advertising and pro-

motion on "kitchen styling" and "model kitchens" over the past few years.

*Adequate Wiring and Piping*—Every home service activity and customer contact, which educates, teaches, and shows customers how our services bring "better living" to homemakers, should explain that the essential link between utility service and its utilization is the wiring or piping system in the customer's home. Wiring and piping systems are hidden from view and, despite the important part which they play in providing satisfactory equipment operation, are all too often out of mind.

*Select and Use Basic Sales Appeals*—In all home service activities and customer contacts, it is essential that basic sales appeals, such as Health, Comfort, Convenience, Economy, Profit, Pride, Pleasure, and Safety be dramatized to sell the use of all residential utility services. In order for home service activities to succeed in selling increased use of utility service, these basic sales appeals must be stressed continuously and dramatically.

*Home Service Success Depends upon a Well-Rounded Program*—The degree of success to be obtained by each utility from home service operations depends upon the extent to which basic objectives and principles are recognized and adequate steps taken to assure successful attainment of sizeable objectives through the combined efforts of the residential sales manager, home service director and the sales promotion and advertising department.

# Summary of Home Service Operations

By G. B. BOCARDE
Pacific Power & Light Co.

Ten companies were sent a questionnaire. Their answers follow:

*Question 1*—Should married women be employed as home service advisers?

*Answers*—Seven companies replied, "No—unless she is the head of a family." One company was in favor. Two companies reported that it depended on the attitude of the community as to whether such a practice should or should not be followed.

*Question 2*—Should a home service adviser be required to hold a home economics degree?

*Answers*—Three companies replied, "Yes," with the thought that the smaller the company and the fewer the advisers the more necessary it is. Four companies replied, "No." Three companies replied that a degree was desirable but not essential, and that other qualifications such as sales ability, were just as important if not more so.

*Question 3*—How long should an adviser be allowed to work in the same territory and the advisability of changes?

*Answers*—Three companies reply, "Indefinitely." One replied, "Every 5 years." Six companies said such changes were made only when necessary, as a girl means more to the community once she is known and the community means more to the girl once it is well known by her. This group further called attention to expense of change.

*Question 4*—The psychology of oven testing from a sales angle.

*Answers*—Seven companies replied that oven testing was done only when it was absolutely necessary and then it should be a positive test rather than one of negative nature. One company reported that it was entirely undesirable. Two companies reported that oven testing was of no particular value from a sales angle.

*Question 5*—In an educational program for employees, what material should be included and how should it be presented or conducted?

*Answers*—Eight companies mentioned the importance of sales training and use of equipment. Four companies said that training should include knowledge and history of the electrical industry, the company and the particular department. Four companies advocated that such training be done at group meetings.

*Question 6*—Should the activities of the home economics departments be considered primarily as aids to load building or goodwill building?

*Answers*—Three companies replied that the activities of the home economics departments should be considered primarily as aids to load building. Five companies considered them primarily as aids to good will building. Two companies replied that one was just as important as the other. Many companies brought out the point that load building was dependent on goodwill and vice versa.

*Question 7*—The home service department is a selling department, and training along that line is most important.

*Answers*—Seven companies agreed with this statement. Two companies replied that selling should not be done by this department. One company replied that their home service girls attended all sales training classes but were not allowed to sell.

*Question 8*—How can dealer coordination be made more effective?

*Answers*—One company suggested following all dealer range sales. Seven companies said to give dealers the same services offered to their company salesmen. One company reported that it has very little opportunity for dealer assistance or coordination.

*Question 9*—Please discuss and present plans for analyzing, organizing and supervising home service work so that we can measure the progress that is being made and show results both in sales and goodwill.

*Answers*—Two companies did not attempt to answer this question because of the long explanation required. Three companies made no comments. One company suggested that the Northwest utilities make surveys and from the results formulate a standard of work. Four companies recognized the necessity for careful analysis, organization and supervision if we are to measure progress. Results are both tangible and intangible.

*Question 10*—How can home service departments in different sections of the country cooperate to their mutual advantage?

*Answers*—Nine companies suggested an exchange of ideas in the form of a home service bulletin or letter. Five suggested that sectional meetings such as this are needed. Two suggested an exchange of summaries from each company which would include successful activities with results. These exchanges should be made monthly or quarterly. Two companies suggested a Northwest home service bureau whose purpose would be to distribute helpful suggestions and plans among the Northwest companies.

*Question 11*—How about increasing the load on rural extensions?

*Answers*—Eight companies suggest that home service conduct rural cooking schools. Six companies suggested making a personal call—especially when chances of increasing load would justify the cost of such a call. One company believed this portion of the utility's job should be divorced from home service work.

*Question 12*—Should we issue home service monthly bulletins for Mrs. Housewife?

*Answers*—If monthly bulletins are not too expensive eight companies are in favor of them. One company reported that results did not justify the expense which made them opposed to such bulletins. One company men-

*Question 13*—How to encourage the goodwill of the customer?

*Answers*—All ten answers conveyed the idea that goodwill was increased by the efficient operation of a company. One company also mentioned the fact that special attention shown to certain customers would play an important part in this phase of our job.

## Table I. Summary of Home Service Operations

| COMPANY | Approx. No. Customers per Home Service Adv. | Advisors per Supervisor | OPERATION: All-Service | Specialized Service | Systematic Coverage | Customer Call per Advisor per Year | Home Lighting Demonstration | Public Lectures and Demonstrations |
|---|---|---|---|---|---|---|---|---|
| Companies—25,000 to 50,000 Residential and Farm Customers | | | | | | | | |
| A. | 9,011 | 1 | | Range | Range Sales | 2,100 | No | Yes |
| B. | 2,500 | 5 | Yes | | Yes | 1,100 | When Possible | Yes |
| C. | 9,666 | | Yes | | Dealer Range Sales | | No | Yes |
| D. | 2,200 | 9 | | Yes | Yes | 1,775 | Less than 1% | Yes |
| Companies—50,000 to 75,000 Residential and Farm Customers | | | | | | | | |
| E. | 4,963 | Div. Sales Mgr.-Supr. | Yes | | New Customers | 835 | 20% | Yes |
| F. | 6,376 | Dist. Sales Supr. | Yes | | Yes | 1,058 | 50% | Yes |
| G. | 2,000 | | Yes | | Yes | 1,250 | Approx. 100% | Yes |
| Companies—75,000 to 10,000 Residential and Farm Customers | | | | | | | | |
| H. | 3,840 | | Yes | | Yes | 1,728 | 75% | Yes |
| Companies over 100,000 Residential and Farm Customers | | | | | | | | |
| I. | 17,800 | 5 | | Appliance | All Appliances | 500 | No | Yes |
| J. | 20,000 | | | Yes | New User | | No | Yes |
| K. | 9,700 | 17 | Yes | | Yes | 1,500 | 33.3% | Yes |

| COMPANY | OPERATION: Direct Selling | Transportation: Company Provides | Transportation: Method | GENERAL ACCOMPLISHMENTS: Home Contacts | E. A. R. | No. Group Meetings | Total Attendance | No. Prospects Submtited for Appliances |
|---|---|---|---|---|---|---|---|---|
| A. | No | Yes | | No Records | No Records | | | |
| B. | Yes | Partial | Private Car Street Car | 21,230 | Not Reported | 337 | 13,959 | 3,396 |
| C. | No | Yes | | | | 120 | | |
| D. | No | Yes | Street Car | Service Contacts and Satisfy Complaints | | | | |
| E. | Light. Equip. | No | Private Car-Bus | 11,695 | 381.77kw. | 250 | 11,007 | 813 |
| F. | Light. Equip. | Partial | Available Trans. | 8,997 | $12,102 | 284 | 15,741 | |
| G. | No | Yes | | 12,754 | No Report | 522 | 43,284 | 911 |
| H. | Yes | No | Private Car | 43,201 | $55,288 | 610 | 24,696 | |
| I. | No | Yes | Street Car | | | | | |
| J. | No | Yes | Street Car | 2,883 | | 226 | 6,120 | |
| K. | Lamp Bulbs | No | Private Car | 22,500 | $32,591 | 159 | 18,686 | |

| COMPANY | SALES TRAINING |
|---|---|
| A. | Training by manufacturers' representatives. |
| B. | Company training program—4 to 6 weeks. Home Service Director and Supervisor. |
| C. | No definite plan. |
| D. | Original training—3 weeks. Lecture course presented by department heads. Subsequent training meetings for group discussion. |
| E. | Personal instruction by Home Service Director. G. E.-La Salle Home Lighting Course. |
| F. | Personal instruction by Home Service Director. G. E.-La Salle Home Lighting Course. |
| G. | Probationary period—six weeks—Training period. G. E.-La Salle Home Lighting—Hotpoint—La Salle Electric Cookery. Public Speaking—Public Relations and Customer Relations. |
| H. | Daily conferences and field training of new advisors. Personal training by Supervisor. G. E.-La Salle Home Lighting Course. |
| I. | Personal study and training by Supervisor. Public Speaking Course. All graduate Home Economists. |
| J. | Personal study—Cooking laboratory—Office procedure. Full preparation of story for group demonstration. |
| K. | Personal instruction by Home Service Director. Home Lighting Training by G. E. Co. Training, operation of electrical equipment. |

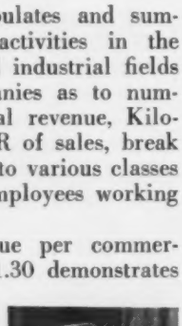
# Commercial and Industrial Sales Bureau*

## Summary of Company Sales Activities

By A. H. WEGNER
The Washington Water Power Co.

THIS report tabulates and summarizes sales activities in the commercial and industrial fields of 13 member companies as to number of customers, total revenue, Kilowatts added and E.A.R of sales, break down of these sales into various classes and the number of employees working on this activity.

The average revenue per commercial customer of $181.30 demonstrates that we must not underestimate the importance of the commercial market.



WEGNER

The reports received as to E.A.R. per kw. of load added in the various fields varied greatly, and it is recommended that thought be given to a uniform method of reporting in order that comparisons will be more accurate.

Only two companies reported using sales campaigns in their 1939 programs. Campaign methods of one company were discussed at the conference.

### Discussion

J. A. LOCKHART—Pacific Power & Light Co. set E.A.R. quotas for each of the divisions at the start of each year, breaking these quotas down to a monthly basis. These break downs were then used for quotas during the campaigns. The campaigns were set up in attractive folders and weekly reports were made on the standing of each salesman. The annual revenue for any one installation to be credited to the campaign was limited to $500. Reports showed that 70 per cent of new business was secured by the salesmen and 30 per cent by the dealers. No attempt was made in the campaign to segregate this business, salesmen being given credit for dealer business and gravity business.

O. C. MAYER stated that in the Idaho Power Co. set up, each office reports all new business coming in through that office, but the salesman reports only the business originated by himself.

Further general discussion brought out the point that most companies do not differentiate between dealer or salesman's efforts as far as reporting is concerned.

Table I

| Co. No. | Full Time | Cust. Per Empl. | Equiv. Full Time Emp. (appx.) Part Time | Light | Cook | Power or Other |
|---|---|---|---|---|---|---|
| 1 | 13 | 724 | | 9 | 3 | 1 |
| 2 | 2 | 1625 | 4 | 2 | 2 | 1 |
| 3 | 19 | 530 | | 7 | 4 | 3 |
| 4 | 2 | | 1 | 6 | 1 | 4 |
| 5 | 10 | 1084 | | 6 | 2 | 2 |
| 6 | 16 | 720 | 11 | 7 | 3 | 1 |
| 7 | | 300 | 4 | | | |
| 11 | 5 | 1125 | 6 | 6 | 2 | |
| 12 | 9 | 655 | 7 | 3 | 3 | 1 |
| 13 | 17 | 1334 | | 6 | 3 | 3 |

Table II

| Co. No. | No. Coml. Cust. | Coml. Only | Com. & Small Indl. | 1938 Rev. | Rev Per Cust. | Total Sales K.W. | Total Sales Ear | Ear. Sales Per Cust. |
|---|---|---|---|---|---|---|---|---|
| 1 | 9,411 | X | | $ 1,906,528 | $208.16 | 6,353 | $ 214,251 | $22.80 |
| 2 | 6,503 | | X | 858,751 | 134.54 | 2,000 | 102,000 | 15.70 |
| 3 | 10,114 | X | | 2,228,323 | 221.00 | 6,986 | 313,500 | 31.00 |
| 4 | 15,491 | | X | 1,671,583 | 111.16 | 9,911 | 237,800 | 15.40 |
| 5 | 10,839 | | X | 1,990,060 | 185.74 | 2,104 | 61,580 | 5.70 |
| 6 | 7,890 | X | | 1,392,665 | 176.50 | 3,930 | 134,300 | 17.00 |
| 7 | 1,237 | X | | 388,071 | 313.72 | 373 | 13,375 | 10.80 |
| 8 | 426 | | | 72,312 | 148.44 | | | |
| 9 | 949 | | | 110,617 | 116.56 | | | |
| 10 | 2,597 | | | 361,611 | 139.24 | | | |
| 11 | 5,626 | X | | 1,154,792 | 208.03 | 2,060 | 85,026 | 15.10 |
| 12 | 5,782 | | X | 1,092,566 | 195.35 | 6,372 | 161,860 | 25.40 |
| 13 | 22,672 | | X | 4,400,148 | 195.00 | 8,142 | 212,755 | 9.40 |
| Total | 99,537 | | | $17,628,027 | | 48,231 | $1,563,447 | |
| Average | | | | | $181.30 | | | $15.70 |

Table III

| Co. No. | Lighting KW. | Lighting Ear | Cooking Baking KW. | Cooking Baking Ear | Water Heating KW. | Water Heating Ear | Refrigeration KW. | Refrigeration Ear | Vent. & Air Cond. KW. | Vent. & Air Cond. Ear | Repl. Compt. KW. | Repl. Compt. Ear | Misc. Power KW. | Misc. Power Ear | Misc. Heat KW. | Misc. Heat Ear | Total KW. | Total Ear |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2,277 | $109,181 | 1,930* | $44,834 | 504* | $10,178 | 231 | $22,383 | 113 | $ 4,315 | | | 1,298 (a) | $ 23,360 | | | 6,353 | $ 214,251 |
| 2 | 1,000 | 80,000 | 1,000 | 22,000 | | | | | | | | | | | | | 2,000 | 102,000 |
| 3 | 3,326 | 185,125 | 1,728* | 50,124 | 194* | 5,631 | 266 | 35,089 | 337 | 12,969 | 115 | $ 6,093 | 727 | 10,069 | 292 | $ 8,397 | 6,896 | 313,497 |
| 4 | 3,627* | 108,810 | 535* | 12,840 | 3* | 48 | * | | | | | | 5,641 | 113,582 | 105 | 2,520 | 9,911 | 237,800 |
| 5 | 1,399 | 41,970 | 396 | 7,920 | 10 | 250 | 109 | 7,085 | 79 | 1,580 | | | 82 | 2,050 | 29 | 725 | 2,104 | 61,580 |
| 6 | 1,453 | 70,649 | 970 | 23,141 | 280* | 7,016 | 265 | 10,565 | 217 | 6,406 | | | 553 | 11,882 | 210 | 4,612 | 3,930 | 134,271 |
| 7 | 125* | 6,250 | 78* | 1,950 | 30* | 750 | 35* | 1,400 | 20 | 1,000 | | | 25 | 625 | 60* | 1,500 | 373 | 13,375 |
| 11 | 1,313 | 65,635 | | | | | | | | | | | | | 747(b) | 19,391 | 2,060 | 85,026 |
| 12 | 1,642 | 57,800 | 2,390 | 33,200 | | | | | | | | | 2,340(c) | 70,860 | | | 6,372 | 161,860 |
| 13 | 2,650 | 108,495 | 3,087 | 45,488 | 153* | 2,200 | | | 52 | 1,406 | 368 | 6,875 | 1,173 | 34,986 | 659 | 13,305 | 8,142 | 212,755 |
| | 18,812 | $833,915 | 12,114 | $241,497 | 1,174 | $26,073 | 906 | $76,522 | 818 | $27,676 | 483 | $12,968 | 11,839 | $267,414 | 2,102 | $50,450 | 48,141 | $1,536,415 |
| $/KW. | | $44.50 | | $20.00 | | $22.20 | | $84.50 | | $34.00 | | $26.80 | | $22.60 | | $24.00 | | $31.90 |

*—Company merchandises equipment for this service application. (a)—includes misc. power & heat. (b)—includes cooking, water heating, refrigeration, air conditioning, ventilation. (c)—includes air conditioning, ventilation (probably refrigeration).

* C. T. Bakeman, Puget Sound Power & Light Co., Chairman; J. A. Lockhart, Pacific Power & Light Co., Vice Chairman; Chairman, Sales Programs and Campaigns Committee, A. H. Wegner, The Washington Water Power Co.; Chairman, Commercial and Industrial Advertising Committee, M. G. Kennedy, Pacific Power & Light Co.; Chairman, Sales Training and Sales Control Committee, O. C. Mayer, Idaho Power Co.; Chairman, Utilization Committee, A. H. Greisser, Portland General Electric Co.; Chairman, Commercial Cooking Subcommittee, D. O. Bergey, Northwestern Electric Co.; Chairman, Commercial and Industrial Lighting Subcommittee, Ladner V. Ross, The Washington Water Power Co.; Chairman, Commercial and Industrial Heating Subcommittee, E. E. Scofield, The Washington Water Power Co.; Chairman, Industrial Power Subcommittee, C. W. Sherman, Puget Sound Power & Light Co.

## Commercial Advertising

By M. G. KENNEDY,
Pacific Power & Light Co.

THE UTILITIES represented in the Northwest Association seem to fall into two classifications; those who do some commercial advertising—and those who don't. The advertising methods that are proving successful among the four or five companies, who are clearing the way for commercial sales with a promotional program, are briefly outlined below. Media used are: (1) exhibits, (2) radio, (3) newspaper, and (4) direct mail.

*Exhibits* — Several companies have used traveling exhibits to promote commercial services with very excellent results. In most cases these exhibits are mounted on trucks, suitable for public inspection but so designed that they may be driven to the prospect's door in

order that he may inspect the exhibit with a minimum of inconvenience. Several manufacturers' exhibits have been used in this way and one or two companies have built exhibits of their own which include several makes of equipment. There are several elements of showmanship which may be applied to such an exhibit. Engraved invitations may be mailed to prospects in advance to advise them of the showing. The truck itself may be attractively painted and when driven through the streets or parked in conspicuous places is sure to create interest. Several companies are planning to wire such trucks so that actual demonstrations of cooking or lighting may be constructed.

*Radio*—Radio as a commercial medium has been used in a limited way by one or two companies to call attention to commercial services and advertise the fact that free surveys will gladly be made by the utility. No check has been made as to results and it is questioned whether this will ever become a valuable or practical way of advertising Commercial services.

*Newspaper*—Newspapers have been used in a limited way to feature commercial services, chiefly through the medium of congratulatory ads which call the attention of the community to the fact that the Blank Establishment is now completely modern, thanks to electricity. The application was felt to have a very definite value, the chief objection being that it was hard to keep in check since newspapers were constantly soliciting such congratulatory ads.

*Direct Mail*—Last of the commercial media being used and by far the most important, is direct mail in its various forms. Three types of direct mail are being used by members of the Association: (1) manufacturer's material, (2) promotional material prepared nationally, and (3) localized direct mail.

*Manufacturer's Material*—Since the utility's primary interest is to sell service and since in most cases utilities do not merchandise commercial equipment, it was the consensus that manufacturer's material advertising specific products might best be mailed out by the manufacturers or their dealers except in rare cases where the utility was the only means of placing the information in the prospect's hands.

*National Promotional Material*—Several manufacturers are now preparing promotional material which does not feature their product but merely attempts to sell the service. This is a step in the right direction that is well received by utilities. The principle objection, however, is that such material is usually designed to appeal to those doing business in metropolitan areas and therefore has little appeal to the businessmen found in the very small towns of the Northwest.

Material prepared nationally by such associations as the E.E.I. is also available and being used. The same comment applies in this case as with manufacturer's promotional material, that is, that it is too general in nature to carry much punch.

*Localized Direct Mail*—The most valuable sales aid in use in the commercial field today appears to be localized testimonial type material. This is effected through the use of "before and after" testimonials and photographs which are developed into broadsides designed to show the prospect how he may profit through the use of electricity even as others are doing who are in his same line of business in the Northwest. While this type of material is a little more expensive to prepare, (2½c to 5c per customer as compared with 2c or less for national material), its appeal is so specific and convincing that it can be strongly recommended. Several commercial salesmen report that a major portion of their new installations are coming from prospects who became interested through reading of other successful installations that were described in broadsides.

The method of using localized broadsides varies. In some cases they are mailed out by the salesman himself a day or two in advance of his call. In other cases they are mailed periodically to all customers of a given classification with as rapid and complete follow-up by the sales personnel as possible. Since it is equally important to keep customers sold on the use of electric service, it is felt that present users should be kept on the mailing list for all material even though it may be desirable for the salesmen to maintain their own specialized mailing just prior to their call.

It is true that the number of commercial and industrial customers served by the companies in the Northwest is in the minority—but what a potent minority. This class of customer at the present time is supplying from 30 to 40 per cent of our existing revenues and at the present time accounting for as much as 50 per cent of the new business being developed. In the residential field from 75c to $1.00 or more is being spent per customer per year for advertising. This is in addition to the tremendous amount of national publicity on residential services. In the commercial field from nothing to 25c per customer per year is being spent with practically no national promotion. Yet the commercial man is perhaps more susceptible to advertising than any other class of customer, since in most cases he is an advertiser himself. Too, he is in business for profit and certainly open to any suggestions which will show him how he can conduct his business more profitably.

Much has been said at this conference about the importance of doing an effective institutional or public relations job. It should be borne in mind that commercial customers are in every case the leaders in the community and strong molders of public opinion. In addition to being commercial customers they and their employees are also residential customers and the impressions they gain of electric service in their business establishments will do much to influence their opinion of residential service.

## Discussion

In the general discussion it was brought out that testimonial type advertising, with before and after pictures, was found to be very effective. Simple installations should be featured instead of large expensive ones.

Trade journal advertising was discussed and it was the general opinion that flame type fuel advertisements were predominant in these publications and that the electrical industry needed national support. A committee consisting of Daniel Brown, D. A. Runyard and A. H. Greisser brought in the following resolution which was passed and submitted to the National Commercial Electric Cooking Council of the E.E.I.

"That the Commercial Electric Cooking Council of the Edison Electric Institute consider the advisability and possibility of the electrical industry's planning and effecting an active publicity and advertising campaign to increase the use of electricity as a commercial cooking fuel, using all national and district trade magazines as its medium."

# Sales Training and Sales Control

By O. C. MAYER
Idaho Power Company

THERE is a fundamental need for sales training and sales control. Each new salesman should be given a broad training in general sales technique in addition to the specific training in his own particular field.

Under the general sales training, the salesman should be given (1) back-

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ground, in other words, know the company's story thoroughly; (2) training in how to deal with people; and (3) be instilled with the knowledge that we are rendering a valuable service to the public.

It is uneconomical to send salesmen to the sales training courses in the East conducted by the manufacturers or other institutions. Organized sales training should be provided within the company.

(He demonstrated the use of LaSalle Correspondent Sales Training Course.)

(Various phases of the general subject were then discussed as follows.)

# Sales Training

By R. E. McDONOUGH
The Montana Power Company

FORM experience gained so far in the commercial field we have come to the conclusion that sales training is the most important phase of sales management. The fact that the sales department has to sell so many diverse kinds of services indicates that men in this work must be versatile. Any one of the specialties involved could be and is a profession in itself. Our experience indicates that it takes at least two years to train the most capable type of man to be a really good salesman in this field. The proper salary schedule that will attract the right type of man for this business is extremely important.

Salesmen must have enthusiasm and interest. This is created in our company by assigning a group of accounts or a certain territory to each salesman, and advising him to handle the business of these accounts as if his own money was invested in them. He is then judged and compensated by the results he obtains. In other words, his job is to worry about the customer and to see that each customer spending money for his electrical installation secures the best possible results from such expenditure.

In a scattered, thinly populated territory like ours, it is impossible to contact salesmen regularly or to hold regular sales training meetings. We have therefore resorted to the bulletin method of keeping salesmen posted.

(Mr. McDonough discussed the nature of these bulletins, the kinds of records to be kept in the general office, the type of representative needed to handle and manage the salesmen's files, how to work with factory representatives of manufacturers and the annual sales conference.)

One of the sales supervisor's big jobs is to point out and correct the faults of the salesmen before they develop into habits. We are all prone to correct bad habits if we are aware of them. It is the bad habit that we are not aware of that licks us.

## Discussion

In the discussion that followed, J. A. LOCKHART stated that all the commercial salesmen of his company are now all-service salesmen rather than specialty men. In the sales training work in his company the men are required to write proposals on the different company services so as to familiarize themselves with the sales stories on such services. At sales meetings the men take turns presenting actual sales interviews.

A. H. WEGNER stated that his company had found written sales proposals excellent training for salesmen as well as good selling tools.

# Sales Coverage

By J. A. LOCKHART
Pacific Power & Light Company

IN surveying the commercial market of our company we investigated the sales possibilities among 20 commercial customers taken at random. We found that 46 per cent of these had direct needs for some service the company was offering, and that each of these customers could make money for himself by using this service. The conclusion is obvious that the customers must be told of the services available.

Each salesman was given a list of the commercial customers in his territory. To insure sales coverage, the company credits each salesman with points based on coverage in addition to the E.A.R. obtained.

## Discussion

O. C. MAYER told how his company controlled sales coverage by requiring a certain number of calls each year on customers of various sizes, as follows: Customers paying over $1,000 per year —4 calls annually. Customers paying from $500 to $1,000— 3 calls annually. Customers paying from $300 to $500— 2 calls annually. Customers paying less than $300—1 call annually.

N. J. MAHAR displayed a form used by the Washington Water Power Co. for service sales calls. This form provides for an analysis of the electric service charges, showing the various steps of the rate, bringing out the economy of additional services. Use of these forms on service calls provides many good prospects for additional service.

# Sales Control

By E. C. BRANCH
Puget Sound Power & Light Co.

A UTILITY is usually divided into several districts or divisions which have direct personnel supervision. This is in turn broken down into population areas with local managers or supervisors responsible for sales operations in those areas. Therefore, commercial salesmen are in many cases located at a distance from the central office and their territories many times overlap several areas supervised by different local managers.

In addition to this direct supervision, there is the general sales office to coordinate the activity as a whole. The modern utility sales department is composed of a group of highly specialized activities. There are the farm men who must keep informed on the many ramifications of farm work, the home service representatives who must know all about electric range operation and keep abreast of the rapid developments in home lighting, the commercial and industrial men must keep up with the developments in heating, cooking, lighting, ventilation and the many other related uses. In addition, there are dealer programs and merchandise sales programs which must be supervised by the district or division control.

In our company the execution of these activities is placed in the hands of the division offices. The general office sales director lays out the sales campaign and programs and is available to assist in special field problems in addition to carrying on an uninterrupted program of training necessary to keep each field representative a leader in his particular activity.

This supervision or control, however, must not cut too deeply into the productive time of the supervised employee or we build up an unproductive organization. How can control be maintained on an even balance between the general office and the Division office without burdening the field men with too many reports?

Commercial salesmen divide themselves into two types: (1) the man who relies upon his own contacts and development work to bring in the business; and (2) the type who basically

dislikes cold contact work and gets his job done by organizing contractors, dealers, architects, manufacturer's representatives and others to do the job for him. Then there is the tendency of some to spend most of their time on a comparatively few large jobs instead of on a balanced work program, and some men concentrate on one service at the expense of the other services.

To make it possible for the supervisor to insure a balanced selling job, our company uses customer survey record sheets which go over the supervisor's desk each day. For each original call the salesman jots down on the form, a record of the customer's installation, which includes lighting, power, heating and all pertinent information which may later be used in subsequent calls. The form is simple and requires a minimum amount of writing. This system provides control over original calls, call backs, records load increase data and automatically sets up a prospect record and direct mail file. At the end of each week, the salesman fills out a report on his activity, showing number of original calls, call backs, demonstrations, talks, dealer calls, load and revenue added and comments on unusual accomplishments. This report is made to the division sales manager with a copy going to the general office. At the end of each month the general office consolidates the individual reports, giving a comparison of the salesmen's standings as well as the progress of campaigns when they are in progress.

This plan keeps the salesmen's reports to a minimum consistent with adequate control information for proper supervision. The salesman feels that his supervision is close at hand and in turn the supervisor and the general office has a clear picture of the salesman's activities.

# Dealer—Contractor Sales Training

By E. E. WALKER
B. C. Electric Railway Co.

ONE CANNOT over-estimate the the value of the utility companies promoting and stimulating the acquisition of knowledge by dealers and contractors. The utility is financially able to carry the expense and usually has facilities, such as an auditorium, which can be utilized for the purpose of educational meetings.

The manufacturers are producing many excellent films and as the utility is the natural pivotal point for the electrical industry, one might consider it their duty, with the co-operation of the manufacturer, to bring such information to the trade. The trade looks for leadership of this kind and appreciates it.

### Utility Schools

The utility takes every care to see that its own staff is properly instructed and there is no reason why many more potential salesmen should not be added to the group in the form of independent contractors and dealers.

With these points in mind the B. C. Electric Railway Co. has just completed its third annual school, in co-operation with the Canadian General Electric, the Canadian Westinghouse Co. and the Northern Electric Co. Last year the total registration was 285; the average attendance was 235, consisting of 115 B. C. Electric sales people and 170 representatives of gas and electric appliance dealers.

The class was split into two sections, one meeting on Monday night and one on Thursday night. The same program was presented for both groups. Each program was broken into three parts. The presentation of the appliance of the evening occupied the first hour, followed by the distribution of a questionnaire which members of the class answered and returned at the next meeting. This was followed by a fifteen minute "Question Box" period, in which members of the class were invited to submit questions on any problem they desired. The most interesting questions submitted were answered from a remote control radio during this period. The third part of the program consisted of a thirty-minute talk on some phase of salesmanship, contributed by a leading Vancouver sales manager or business man.

Programs commenced at 8:00 p.m. and closed not later than 10:00 p.m. The subjects of the evenings were supplemented with movies, lantern slides and specially-written skits. Subjects covered each evening were: (1) "Selling the Modern Kitchen," (2) "Salesmanship and the Home Improvement Plan," (3) Home Laundering, (4) Business Practice, (5) Small Appliances, (6) Advertising and Display, (7) 1938 Dealer Plan, (8) Electric Cooking, (9) Wiring and Service Aids, (10) Hot Water—Gas and Electric, (11) Refrigeration, (12) Gas Cooking.

There was a registration fee of $1.00 which entitled the student to attend the banquet which completed the session and where the new business-getting efforts for 1938 were portrayed in a both serious and humorous way through a stage presentation entitled "The Class of 1938."

One of the disadvantages of the 1937-38 class was that, on account of being spread over many weeks, it precluded the attendance of outside members of the trade. Therefore, we decided this year to concentrate the whole of our efforts into a two-day school, starting at 9:00 o'clock in the morning and continuing throughout the day and into the evening, under the sponsorship of the manufacturers and the utility. This enabled our rural members to come in for a few days and take advantage of the proceedings. The total registration was 362 and the average attendance, 260. Registrations included 110 B. C. Electric sales people, 200 dealers and 50 others, such as distributors. The registration fee also on this occasion entitled the participant to attend the banquet which terminated the school.

Subjects presented were: (1) Electric Cooking, (2) Electric Refrigeration, (3) Kitchen Modernization, (4) Home Laundry Presentation, (5) Lighting (6) Gas Cooking, (7) Automatic Water Heating, (8) Table Appliances, (9) "Rates as They Affect Appliance Sales," (10) Rural Sales, (11) Electric and Gas Industry Banquet.

# Utilization Committee Report*

By A. H. GREISSER
Portland General Electric Co.

YOUR Utilization committee has presented a program which definitely indicates our commercial and industrial customers constitute a large and profitable potential field for additional electric energy sales. However, considerable effort and attention must be directed toward (1) analyzing these customers' needs; (2) evaluating the electric equipment available to perform an economic service for the customer; and (3) determining the best methods of sales promotion to acquaint the customer with the electrical equipments which will be profitable for him to use.

Market analysis is of primary importance. Throughout the conference held yesterday by the utilization committee, the underlying objective for the reports and discussions was to determine the extent and nature of the new markets available for newly developed electric energy using devices. We have attempted to outline the approach to selling these markets at a profit to the elec-

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tric utility; and equally important—to know that we have given the customer an opportunity to increase *his* profit.

New electric equipment often introduces problems for the utility sales organization. Power-factor and load-factor operating characteristics of some electrical devices, on preliminary consideration, are believed not to be desirable for the ordinary electric distribution system. However, these problems are generally solved by an intelligent and thorough analysis of the equipment, and by ascertaining the proper market or application of that equipment. This point is exemplified by the fluorescent lamp. We are indebted to Walter E. Potter of the General Electric Incandescent Lamp Department for presenting a well-balanced discussion of "lighting values" with particular reference to the fluorescent lamp.

The policy on the use and promotion of this efficient light source is clearly outlined by the General Electric Co. in a recent bulletin to the trade, bringing out the fact that this new lighting should not be sold on the basis of economy but for its advantages for particular installations.

The lighting sales committee also discussed the large available market in lighting for city streets, intersections, and for highways. George M. Boyd, lighting specialist, Westinghouse Electric & Manufacturing Co., pointed out to us that, to sell such lighting load with satisfaction to the buyer and reasonable profit to the seller, we must promote the market from the standpoint of selling visibility for night traffic safety.

In D. O. Bergey's report for the commercial cooking committee, a very interesting and valuable summary of buying motives was presented. This committee determined that the cost of electric equipment for the food purveying industry, is the chief obstacle to its sale. Operating and wiring costs are subordinate in the ordinary case. The most effective buying motive is gain and economy.

Commercial water heating was considered by D. A. Runyard's committee, which proved the existence of a market virtually untouched. Small-capacity water heaters of both the non-pressure and pressure type, have broadened the markets for electric water heaters in commercial establishments and in offices.

The commercial and industrial heating committee, of which John D. Scott was chairman, explained the various applications of electric heating equipments. Some newly developed applications, such as lamps and reflectors for radiant-energy drying, have almost unlimited potentialities in the plants of our commercial and industrial customers. This particular heating medium has the desirable attribute of flexibility; and thereby, permits trial installations at reasonable expense.

Diesel competition was not found to be a serious factor in industrial power sales, although C. W. Sherman cautioned us to be thoroughly informed on Diesel progress. The few utility loads lost to Diesel were chargeable to some failure in the rendering of service. The utility company had neglected the customer.

## Market Analysis

By T. W. FITCH
Portland General Electric Co.

THE FLUORESCENT lamp has certain applications and characteristics which set it apart from other light sources, and requires consideration of many things not encountered with other sources. Power-factor is one of the main items to be given consideration, and publicity to date has not adequately stressed this feature. Publicity has spread the impression that the fluorescent lamp is the answer to "plenty of light at low cost" and "daylight color values which will supersede mazda color values." The fact that the main application for fluorencent lighting is high efficiency color generation, cool light at points where incandescent heating is objectionable, for color correction, and for supplementary lighting primarily has not been realized. Neither has the cost of fluorescent installations with auxiliaries required for each lamp and the wiring restriction caused by power-factor characteristics, been understood by the general public.

National attention has been turned toward street lighting and highway lighting as a means of lowering accident records, increasing safety on highways and utilization of the highways. Street lighting revenues will follow this trend if promotional effort is directed toward it.

Sterilization lighting has been touched upon lightly because of the present lack of activity and soft pedaling of the product by manufacturers.

School lighting was passed over because of lack of time and the fact that the subject had been quite adequately covered in previous conventions, and is rapidly getting beyond the promotional stage.

## Fluorescent Lighting Applications

By C. T. BAKEMAN
Puget Sound Power & Light Co.

THE NEW fluorescent lighting sources offer a new lighting tool which opened new fields of lighting service and helps solve many previously difficult problems. These new sources also present a challenge to the lighting men and particularly to the utility lighting representatives. The tremendous amount of publicity heralding the remarkable gains in lighting efficiency has developed a great deal of interest among the trade and our customers. This publicity, which was well founded on the basis of higher levels of lighting made possible, as it trickles down through the trade, has become diluted to the point where the customer is thinking in terms of the dollar saving in his light bill rather than the additional amount of lighting that the higher efficiency lamps make possible.

1. *Fluorescent cannot be successfully sold on the basis of reduction on the lighting bill which may be obtained.*

In our territory, fluorescent lighting has obtained some satisfactory stimulation and some serious set-backs by the initial installations made. They help illustrate the challenge to the utility lighting men. In one case, fluorescent lighting of a direct type was installed for general lighting in a dairy store in a small town. Although the manufacturer's representative initiated the sale by telling of the advantages of the additional lighting, the more frequent contacts of the contractor finally sold the job on the basis of a saving in the electric bill. Due to an oversight he did not include auxiliary power and particularly because of additional light sold for the marquee borders, the customer's bill actually was larger than his previous lighting cost. Imagine the

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customer's reaction when he failed to receive the major benefit which he had exptected to receive for this substantial investment.

2. *The compromise in the fluorescent investment gives the customer no tangible benefits from the still substantial investment made.*

In another case, a restaurant, an entirely adequate and fairly good installation was proposed by the dealer and manufacturer's representative. However, when costs were quoted, the customers would not pay for the adequate fluorescent job and the dealer compromised on a little less than half the lighting originally planned. This customer does not have an adequate lighting job, and does not obtain the benefits of a well lighted restaurant. He must charge the entire fluorescent investment to a small saving in the light bill and still has the additional cost of fluorescent lamp replacements.

3. *Proper correction factors or calibrated screens should be applied to meters for fluorescent lighting measurements.*

4. *Regular design procedure should be used with proper allowance for the special type of fixture used.*

A direct lighting installation using four rows of seven 3-ft. daylight fluorescent units each was made in a 16-ft. x 21-ft. drafting office having a 10-ft. ceiling. Reported ft.-candle measurements varied from 20 ft.-candles on up to a high of 60 ft.-candles from various observers. Personal reaction varied almost as greatly, some saying that there was not that much light, and others that there was too much light in the room. These reactions are explainable. Ordinary light meters in field use cannot be accurately used to measure various fluorescent installations since these meters are calibrated to approximate eye response for the ordinary color temperature of incandescent sources. Since each meter responds differently to various color temperatures, various readings are obtained for the various fluorescent sources. The preliminary meter readings on this installation indicated upwards of 90 per cent utilization factor for this room. The most optimistic design would indicate a utilization of 0.46, which, under average service conditions would give 27.5 ft.-candles. A recent in service test by a properly calibrated Weston meter with average service conditions showed a reading of 27 ft.-candles.

5. *Proven lighting fundamentals must be followed in fluorescent as in incandescent.*

The reaction that "there was not that much light" is proven by the fact that there was not that much. The reaction that there was too much light in the room may be explained by the fact that this was essentially a direct lighting installation. While the brightness of the fluorescent units is lower than an ordinary exposed incandescent bulb, the expanse of this brightness in the field of vision is bound to produce discomfort over extended periods of work.

There is no substitute for the maximum comfort of a properly designed indirect system. Fluorescent lighting cannot be economically or successfully sold on the basis of saving in lighting cost—at least for general lighting. In general lighting installations of equivalent type and quality, there is generally no over all saving under an incandescent system if the lamp replacement and investment costs are included.

Fluorescent lighting offers an excellent additional lighting tool if applied to installations where its special advantages are needed. Special advantages include daylight equality, cold radiation, efficient color production, tubular shape, and relatively low brightness.

# Selling Visibility for Night Traffic Safety

By GEO. M. BOYD
Westinghouse Electric & Manufacturing Co.

A GOOD sale is one which results in satisfaction to the buyer and reasonable and sound profit to the seller. Buyer satisfaction may come from money saved, money made or added convenience, and comfort, or lessened hardships and losses. Not until a seller really knows that what he is offering holds something of real value for his prospective customer, and gets that something across to his customer, will he be successful in making and continuing to make sales.

Street lighting sales have fallen down because we have been almost wholly selfish in trying to make them. For this same reason, curtailment in street lighting was and is almost the first curtailment to be made. Yet street lighting is a necessity and will be bought if it can be shown to meet a need.

### Need

Traffic accidents are enormous and tragic these days. Some 32,000 people died in and from autos last year and 1,100,000 non-fatal injuries occurred. There was an economic loss of one billion dollars. The total fatalities in the Northwest were 1,396. Economic loss was $56,400,000. Idaho lost 196 citizens; Montana 108; Oregon 327; Utah 217; Washington 483; and British Columbia 92.

Traffic accidents and fatalities take place in larger numbers in the rural areas and towns of less than 10,000 population. Since 1924 rural traffic accidents have increased 172 per cent as compared to 31 per cent increase in urban areas. Since the territory in the Northwest Association falls largely within the above classification, those figures should be significant.

But most significant of all to us should be the facts that:

1. 9,000 more people were killed at night during 1937 than in the daytime. (1938 figures not in yet.)
2. 25 per cent of the 24-hour traffic produces 60 per cent of the traffic fatalities.
3. The night rate (ratio of accidents to exposures) is 6 to 10 times higher than the day rate.
4. 10 per cent of our streets and highways see 41 per cent of the accidents.
5. Deaths in the rural areas are on the increase. Of the 24,000 killed during 1937 at night, 16,000 were killed in the rural areas.
6. While daytime accidents are dropping, nighttime accidents are still going up.

Safety campaigns by many agencies are being conducted to educate the driver and pedestrian. Roads are being improved and hazards eliminated. Safety devices of every known kind are being put into the automobiles. These are bearing results so far as the daytime accidents are concerned. Yet no real move has been made to reduce accidents in the nighttime. We who can make the largest contribution at this point have offered none.

Visibility conditions are really the only difference between nighttime driving and daytime driving. True there is a difference in pedestrian traffic and traffic congestions. They are both less by a great deal and on that basis the accidents should be less by the same amount. The drivers are the same. Roads, cars, speeds (practically), laws and weather are the same. In the daytime there is good visibility and at night poor. Here was our cue in designing street lighting units—they must produce better visibility—and here is our cue in selling street lighting—we must sell better visibility.

### The Opportunity

The time is riper now than it has ever been for the electrical industry to make its contribution to the great need—reduction of night traffic accidents by showing how greater visibility can be obtained. The time is ripe because:

1. The minds of the people are susceptible to any reasonable solution offering a reduction of accidents.

2. The powerful interests as represented by the Automobile Manufacturers Association, American Petroleum Institute, Portland Cement Association, The National Highway Users Conference, and The American Automobile

## Table I—Northwest Restaurant Operator and Electric Cookery—Needs and Opinions

| Available electric cooking equipment | Lunch Counters | | Restaurants | | Hotels | | Institutions | |
|---|---|---|---|---|---|---|---|---|
| | Need | Remarks | Need | Remarks | Need | Remarks | Need | Remarks |
| Toasters | 100% | Automatic | 100% | Automatic | 100% | Automatic | 100% | Conveyor type |
| Waffle irons | 90 | | 100 | | 100 | | 20 | |
| Sandwich toasters | 100 | | 60 | | 50 | | 10 | |
| Meat grills | 70 | | 60 | | 10 | | 10 | |
| Automatic griddles | 100 | | 80 | | 70 | | 50 | |
| Egg boilers | 70 | | 80 | | 80 | | 40 | |
| Coffee makers | 100 | Improve Silex design | 90 | Improve Silex design | 90 | Urn | 70 | Urn |
| Speed units | 70 | | 80 | | 70 | | 80 | |
| Food tables | 90 | | 90 | | 90 | | 80 | |
| Plate warmers | 30 | | 60 | Local design | 80 | Local design | 80 | Local design |
| Roll warmers | 40 | | 80 | | 80 | | 60 | |
| Ranges | 30 | | 70 | See 3 items below | 80 | See 3 items below | 90 | See 3 items below |
| Cooking tops | 50 | | 80 | Preferred | 80 | Preferred | 90 | Preferred |
| Roasting ovens | 30 | | 80 | Preferred | 90 | Preferred | 90 | Preferred |
| Baking ovens | 20 | | 80 | Preferred | 90 | Preferred | 90 | Preferred |
| Fry kettles | 90 | Reduces cooking top area | 100 | Reduces cooking top area | 100 | Reduces cooking top area | 70 | Reduces cooking top area |
| Stock kettles | 0 | | 70 | Reduces cooking top area | 70 | Reduces cooking top area | 90 | Reduces cooking top area |
| Pressure cookers | 0 | | 70 | Reduces cooking top area | 70 | Reduces cooking top area | 80 | Reduces cooking top area |
| Proof boxes | 0 | | 30 | | 70 | Local design | 70 | Local design |
| Candy cookers | 0 | | 20 | | 40 | | 0 | |
| Broilers | 50 | Improve design | 80 | Improve design | 80 | Improve design | 60 | Improve design |
| Water heaters | 90 | | 70 | | 40 | | 40 | |

Association, which have opposed street and highway lighting because they feared the diversion of tax funds from road building, are beginning to realize that there might be a value in lighting for the prevention of accidents.

3. The National Safety Council and the American Road Builders Association have accepted lighting as a valuable safety measure.

4. Traffic engineers and many State Highway Departments are beginning to tie in street and highway lighting closely with traffic engineering and traffic safety.

5. The United States Junior Chamber of Commerce has begun a national "Safety with Light" program.A booklet of 32 pages contains this program and has already been distributed to every junior chamber. In addition to the Program Booklet, each chamber will be furnished with other literature, films and publicity material.

6. The Edison Electric Institute is now planning a national educational campaign on street and highway lighting such as was conducted in connection with the Better Light-Better Sight movement.

### Results

The customer will receive from a street lighting system that actually produces good visibility, using the words of the Junior Chamber of Commerce, "improved business conditions, dollars saved, more for their money, and most of all, lives saved." The utility will get better satisfied customers with a consequent greater willingness to pay and to keep the system up to standard in visibility, and increased revenue.

### The Market

The market is large. There are some two hundred towns of 2,500 to 10,000 population served by the utility members of this organization. These towns have an average of at least 100 street lighting units. If these units were equipped with an additional 100 watts each, which was the experience of the Puget Sound Power and Light Co., there would be an 8 million kw.-hr. addition. There are hundreds of small towns between 500 and 2500 to which visibility lighting will appeal.

Let us not overlook the highway lighting possibilities. Dangerous intersections, overpasses, underpasses, bridges, traffic circles and short hazardous night areas, while not large in their individual requirements, will reach a nice total.

### The Program

A successful program for the selling of "visibility for night traffic safety" should thoroughly educate the salesman in the following facts:

1. Selling visibility not street lighting.

2. Why the present systems do not meet the needs of today. Speed must be matched with visibility.

3. The difference between light and visibility. Only the light reflected from the street surface to the eye is usable light in producing visibility.

4. A fixed lighting system installed along the roadway, properly mounted, equipped with units directing the light in such a manner that the eye may successfully use it, is the only means we now have at our command for producing good visibility.

5. Why the units now offered by the manufacturers for producing better visibility do this more efficiently.

6. How and where to install the units to get the best results.

As a backup for the salesman, the public must be educated on the deficiency of the present systems and the values in these later and more scientifically designed units. .To accomplish this a planned publicity campaign is indicated, to include:

1. News stories and cartoons in the press and radio talks.

2. A booklet such as was issued by the West Penn Power Co. in the present successful campaign they are conducting and the program booklet by the Junior Chamber of Commerce setting forth the essential facts for the reduction of traffic accidents through visibility, "before" and "after" photographs showing the improvement, etc.

3. Sample installations. Never install one unit. Always several within close proximity and properly related to give the best results.

If an entire installation cannot be secured, go after the danger points and hazardous areas. These offer strong arguments. After units have been installed at these points it will be surprising how this will bring demand for other units, and even a complete installation.

# Commercial Cooking Sales Survey*

By D. O. BERGEY
Northwestern Electric Co.

THE SALES SURVEY presented herein in Tables I and II constitutes a new approach to the analysis of sales opportunity in the commercial cooking field. One representative specializing in commercial cooking in each of 11 member companies was asked to give his opinion, based on interviews with restaurant operators, as to the need for various pieces of electric cooking equipment in different classes of establishments. He also secured from these operators their views on buying motives and the efficacy of selling methods.

Each utility company representative then weighted the answers to these interviews and turned in one answer representative of opinion in his territory for each of the several pieces of equipment and for the questions asked. The

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**Table II—Northwest Restaurant Operator and Electric Cookery—Needs and Opinions**

| | Lunch Counters Remarks | Restaurants Remarks | Hotels Remarks | Institutions Remarks |
|---|---|---|---|---|
| What are the most effective buying motives? | | | | |
| Gain & economy..... | 73% | 67% | 73% | 77% |
| Comfort & convenience. | 12% | 17% | 14% | 8% |
| Safety & protection..... | 8% | 10% | 7% | 8% |
| Satisfaction of pride.... | 7% | 6% | 4% | 7% |
| Satisfaction of affection | | | 2% | |
| Do the operators buy through— | | | | |
| Demonstration ..... | 36% | 36% | 32% | 32% |
| Testimony ..... | 64% | 64% | 68% | 68% |
| Number of customers served—total ..... | 3182 | 2231 | 866 | 316 |
| What is the chief obstacle to the all-electric kitchen? | Cost of equipment..52% | 50% | 50% | 49% |
| | Operating cost ....20% | 23% | 23% | 26% |
| | Wiring cost.....20% | 19% | 19% | 17% |
| | Miscellaneous ..... 8% | 8% | 8% | 8% |
| What is the chief prime mover to the all-electric kitchen? | Food, labor, maintenance & space saving, lower future rates, competitive rates, advertising, satisfied users .....47% | 49% | 53% | 50% |
| | Cleanliness, better equipment, convenience .....41% | 39% | 35% | 38% |
| | Safety .....10% | 10% | 10% | 10% |
| | Pride ..... 2% | 2% | 2% | 2% |

tabulation, giving the percentage rating in each item, was arrived at by mathematical calculation from the answers received from the utility companies. Remember, these answers reflect the views of the restaurant operators in the companies' territories.

Table I represents answers from only 10 companies. In Table II, the total number of customers served is the sum of the customers of only 10 companies.

This survey is not presented as being final and conclusive. It is a first attempt at this approach to such a survey and as such is subject to the imperfections of a first effort. It is, however, indicative of what the situation is with respect to the need for the different appliances and with respect to the relative importance of certain buying motives and selling methods. It is believed that all manufacturers, dealers and their salesmen, the commercial selling departments of the utilities and the advertising agencies handling manufacturers' or utilities' accounts should be familiar with the result of this survey.

## Discussion

Discussion of this survey revolved around the new equipment necessary in the commercial cooking field.

The increasing loss of an important portion of the commercial cooking load for brewing and maintaining the temperature of coffee in restaurants has become serious. The free distribution of a new type of gas-fired, glass coffeemaker stove, equipped with a self-filling, automatic temperature controlled water tank enclosed in the unit, is the equipment that is rapidly replacing all makes of electrically heated glass coffee maker stoves, particularly due to its automatic tank feature. This equipment is loaned to the customer by the coffee companies.

There is also an increasing demand for an upper and lower fired electric broiler to compete with a gas broilator. This has its place in smaller lunch rooms, hamburger stands and drug stores.

# Commercial Water Heating

By D. A. RUNYARD
California-Oregon Power Co.

KILOWATT-HOUR sales through the medium of commercial water heating present a wide market. Immediate prospects for this type of service include restaurants, fountains, hotels, apartment houses, meat markets, garages, groceries, barber shops, beauty parlors, beer parlors, bars, service stations, chocolate melting in candy manufacturing, steam cleaning for garages and service stations, and sterilization in dairies.

While some company regulations relative to charging hours and installed heating capacity may be a hindrance in securing commercial water heating business, these conditions can be met by selling sufficient storage capacity to take care of the peak demand.

Smaller-size, non-pressure, 2 to 3-gal. capacity tanks for specialized applications were discussed, and the committee felt that there was an active market for this type of equipment.

The effect of time clock control as applied to commercial water heating is a controversial subject and the few minutes allotted to this program is not sufficient time for discussion.

Other subjects discussed included estimating water heating requirements and recovery time. Some discussion was had on water heating advertising, and it was found that only one company in the Northwest has been carrying on commercial water heating advertising during the past year.

# Water Heating in Job-Printing Shop

By D. D. MOFFAT, JR.
Utah Power & Light Co.

FOR SEVERAL years we had attempted to secure the first installation of electric water heating in small newspaper offices and job-printing establishments. We found a uniform antipathy to this because it is generally felt that there was a certain amount of dirt connected with printing that there was no way of controlling. Recently a paper came to our attention concerning the prevalence of lead poisoning, together with an excerpt from the National Safety Council health practices pamphlet which showed that lead poisoning was responsible for from 16 to 19 per cent of the occupational diseases reported.

We then proceeded to point out to the owner of a small job-printing establishment the danger of lead poisoning in that lead oxide dust is very common in printing shops, and is deposited on the fingers through contact and then conveyed to the mouth. The next problem was to prove that this could not be removed by cold water. As soon as this was proven to the owner he installed a 40-gal. automatic electric water heater, and he is very well pleased with the safety and convenience provided at small cost.

# Water Heating Cuts Mine Costs

By D. D. MOFFAT, JR.
Utah Power & Light Co.

IN ONE of the large silver and lead mines in the Park City Division of our company we were recently successful in replacing a 1,000-hp. steam engine with modern electric drive utilizing a 400-hp. electric hoist. The boilers were also used for heating purposes and provided the hot water for the main kitchen in the boarding house, for the bunk house, office, and shift bosses change room. Instead of considering the job completely sold with the installation of electric power, the salesman began to think about the possibility of electric water heating. The customer was skeptical of the use of electricity for this purpose and it was some time before he would even listen to electric water heating for these applications. A complete study was made with a written sales presentation giving actual figures and cost studies.

This study indicated that a saving in both coal and labor costs would be made by installing automatic electric hot water heaters. Accordingly a 40-gal. heater was installed for the change room, another 40-gal. for the office, a 140-gal. for the kitchen and another 140-gal. for the bunk houses. In addition a 110-gal. heater had been installed previously in the boarding house at the new shaft location on the other side of the mountain.

The installation of these heaters enabled the mine to shut down its large steam boilers during summer operations and dispense with a very wasteful steam line some 300 yd. in length supplying steam for hot water.

The over-all result was superior hot water service at a substantial saving. The saving in coal amounts to about $6.00 a day during the summer and about $2.00 a day during the winter. Additional savings in labor costs are effected by transferring two fairly high priced boiler men to other work, and replacing them with one lower priced man to fire for such steam as may still be required. The superintendent of this mine estimates his overall saving at about $10.00 a day, and is well pleased with the installation. Incidentally, all cooking is done electrically.

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* Subcommittee Report.

* J. D. Scott, Portland General Electric Co., Chairman; B. C. Electric Railway Co., H. O. Bulmer; The California Oregon Power Co., W. J. Moyer; General Electric Co., L. R. Elder; Idaho Power Co., O. C. Mayer; Northwestern Electric Co., U. K. Petersen; Puget Sound Power & Light Co., Harry Batchelder; Utah Power & Light Co., D. D. Moffat, Jr.

# Commercial and Industrial Heating*

By J. D. SCOTT
Portland General Electric Co.

IN PREVIOUS conferences this committee has stressed the necessity for industrial heating surveys of prospective load, the advertising features of sales promotion, the accumulation of data on individual heating jobs and the use of uniform data sheets so that the accumulated information could be made easily available to all member companies in the territory.

This year we emphasize the engineering and service features of heating sales work, and the types of problems encountered in making and keeping a job sold. There has been considerable discussion in past years centering around how to meet competitive fuel and equipment costs and how to convince the prospective customer of the economic and production advantages of electric heat.

Not a great deal has been said about the human relations problems involved, nor about the obstacles encountered in meeting the rigid enforcements of wiring, building and plumbing codes and fire underwriters' requirements. Many a heating job would never go electric unless the power company's representatives took over these burdens.

The installation of commercial and industrial heating applications is intimately bound up with such problems and a frank discussion of them should be of benefit to every one concerned.

# Radiant Energy Drying

By H. S. JOHNSON
Portland General Electric Co.

ONE of the most recent developments in the field of industrial heating is the radiant energy drying process by means of incandescent lamps and reflectors. Ironically, after years of research by manufacturers of lamps trying to get rid of the heat produced by lamps, someone at last made use of this unwanted heat.

As implied by the name, the process makes use of the radiant heat given off from the incandescent filament of a lamp which is similar to an ordinary lighting lamp operated under-voltage. In fact, an ordinary lamp might be used satisfactorily, since between 80 and 90 per cent of the energy output is in the form of radiant heat energy. However, special lamps are justified by the tremendous increase of life—around 10,000 to 15,000 hours or more as compared to 750 to 1,000 hours for the ordinary lamp.

The lamps that have been developed for use in this process are either the G 30 clear, or the 250-watt PS 30 clear, both with the medium screw base. The Mazda lamps have tungsten filaments while the Nalco lamps have carbon filaments and a much shorter rated life—1,500 hours for the G 25 and 500 hours for the PS 30.

Since the development of the use of this heating process has not had sufficient time to bring out experience in the type of reflectors best adapted, not much can be said about the particular type of reflector to be used for a particular installation. We do know, however, the general requirements of such reflectors. They are: (1) a highly polished surface; (2) a surface of high-reflectivity in the infra-red region; (3) a reflector that will redirect most of the output of the lamp, and (4) a durable surface that will not easily be damaged by paints, inks and cleaning.

In discussions with possible users of this process you should inform them of patent rights held by the Ford Motor Co. and suggest that they obtain permission before making use of the patent. A letter from the General Electric Co., dated March 15, 1939, states:

"1. Ford Motor Company has been granted a patent on this process.

"2. Ford Motor Company has licensed the following concerns to produce equipment for this purpose: C. M. Hall Lamp Co., 1035 East Hancock Ave., Detroit, Mich., and Infra-Red Ray Devices Co., 2901 West Grand Boulevard, Detroit, Mich.

"3. As yet no other concerns have been licensed under the Ford patent.

"4. Ford Motor Co. is glad to have us encourage the use of the process and the sale of our lamp bulbs in connection with the devices of the above two approved licensees."

The applications for which this method of heating can be used are by no means all discovered. Only a very few of the uses have been tried, and with a surprising success. The greatest single application, and the one for which the Ford Motor Co. developed its patent, is that of paint drying, in the case of those paints that dry by evaporation of the thinner or solvent. Paints which dry by oxidation cannot be dried by this method. The advantage of this method is in time saved. It has been found that infra-red heating will dry paint in about 5 to 10 min. compared to about 70 min. when steam-heated ovens are used.

Under this classification can be included the drying of automobile bodies, and all parts which are coated with paint. Since practically all furniture is painted or finished with evaporating type paints or varnishes, radiant energy drying may be a very practical way of speeding up production. In the printing industry infra-red drying will, in all probability, solve the problem of ink drying. Cleaning establishments might make use of an installation to speed up the drying of carpets and other heavy work when time is an element. Blue prints can be dried quickly and without distortion, and the same thing might apply to photographs. A possible application might be the drying of the film or silvering on a mirror, and the subsequent coats of shellac and paint which cover and protect it. Such an application would do away with expensive steam tables and poor working conditions.

It has been found that the temperature resulting in a pile of iron filings passing on a conveyor beneath an infra-red battery of lamps was of the order of 300 deg. F. This fact might suggest that food in cans could be cooked by this method. At the present time, Ford uses this heating for expanding pistons so that the wrist pins and sleeves can be easily assembled.

The revenue that can be expected from this new development cannot be estimated to any degree of accuracy at the present time. Since, however, most installations will either be new or replace competitive forms of heating, infra-red heating will be well worth promotion by a utility out after increased consumption.

# Electric Air Heating Market

By C. W. BRISSENDEN
Portland General Electric Co.

TO cover the present and future market for electric air heating is impossible; but the following gives an idea as to the magnitude: (1) small offices; (2) large offices (auxiliary); (3) processing plants; (4) outlying barber shops; (5) filling stations; (6) photograph studios; (7) printing shopts; (8) greenhouses, and (9) special applications.

Under processing plants would fall such applications as controlled ripening of bananas. Special applications cover a multitude of processes such as paint and varnish drying and mushroom propagation.

After the potential market has been established we must decide whether or not we may reasonably expect a profitable net revenue from such a load, which involves a variable number of factors. Electric air heating is generally seasonable, being spread over a period of from six to eight months, but due to the dissimilarity of applications, we can reasonably expect a relatively good average load factor. This is further aided by the fact that practically all electric heaters are automatically controlled and a wide diversity of operation can be anticipated.

Having decided that we have a potential market and may expect a compensatory revenue, we are still confronted with the sales problems and expenses involved. The very nature of this type of load makes it necessary to treat each job as a separate problem, and ordinarily there are no standards to go by. This means a detailed study of the particular problem at hand and subsequent follow-ups to see that the recommendations are carried out. It is only reasonable to expect that some jobs will not warrant the time and money spent on them, but the goodwill gained may more than offset the difference. On the other hand, some jobs will offer a nice return and will require little or no sales expense.

In order to outline the steps it usually is necessary to follow in selling special heating jobs, I offer the following concrete case and outline the sales problems involved.

### Heating and Air Conditioning for Mushroom Growing

As is the case with the majority of special jobs, this customer approached us with only a hazy idea of what he desired, and wanted us immediately to give him a solution to his problem, including investment and operating costs. The first steps were to determine the conditions necessary for mushroom propagation and to inspect the customer's premises to see what would have to be done to make it possible to fulfill the requirements electrically.

Our survey revealed the following problem:

*Given:* Two unfinished adjacent houses 18½ ft. x 65 ft. x 18 ft., equipped with the necessary beds for growing mushrooms.

*Required:* An inexpensive heating and air conditioning system with variable automatic temperature control and proper air circulation.

*Solution:* Considerable time was involved in merely finding out what was given and what was required, but probably no more than is necessary on the average job. Most of the time and expense required on a prospect of this type is of course spent in the actual solution and supervision of installation. In this case it was necessary to make recommendations on the most economical type building insulation to use, as well as to work out the details of the whole heating and ventilation system. This necessarily involved complete heat loss calculation, duct design and layout, wiring layout, simple means of humidification and automatic heating. In carrying this out it was necessary to know or to find out what equipment was available in the price range. After the system was all laid out, the next step was to secure estimates on fabrication and installation costs. At this point we were ready to present our recommendations to our customer and show him why it should be used.

*Sale:* Up to this time our job had been an engineering problem, but after all information had been secured and all data compiled, it automatically became an engineering sales problem. It was necessary for us to show why automatic electric heat was the system to install in spite of higher operating costs. This was done by presenting the advantages to be gained—absolute temperature and humidity control, meaning insured uniformity of product; lower maintenance and labor costs; lower investment and depreciation costs. In this particular case where the sole buying motive was gain and economy, we were fortunate in being able to point out sufficient tangible savings to overshadow the increased operating cost, and we were therefore rewarded with a sale.

*Conclusions:* Although only an outline of this sale was given, it can be readily seen that considerable expense on engineering analysis and design was involved, and it may be questionable whether or not we will receive adequate return on our investment. A total of 8 kw. was installed in each of the units, but the on-peak demand is never more than 8 kw. as they are used alternately, and the annual earned revenue is approximately $130.00, or $16.00 per kw. connected.

# Electric Heat for Drying Apple Sauce

By EDWARD E. SCOFIELD
The Washington Water Power Company

THE NEWEST application we have for industrial heat is one being made in the apple belt at Peteros, Wash. A process has been developed on a small scale for converting cull ap-

ples into dried apple sauce. This product, so the inventor claims, has a tremendous potential market.

Arthur Fowler Co. of Spokane have applied electric heat to a machine which takes the cooked apple sauce and evaporates the water, reducing the moisture content to about 6 or 7 per cent. This machine consists of an endless steel belt about 39 ft. between centers—the belt being 20 in. wide. The cooked apple sauce is applied at one end of the belt and goes through the drying oven on the belt, it being sufficiently hardened by the time it travels the 39 ft. to adhere to the belt and return on the bottom side where it is scraped from the belt at the same end at which the liquid was fed.

The electric heat is applied by radiant heating coils underneath the top belt and above the lower belt. About 55 kw. is installed and arranged so that the amount of heat is relatively large at the beginning and tapers off near the end of the travel. Also dry hot air is blown along the under side of the oven to remove the moisture saturated oven atmosphere.

Of course the whole process is still in the experimental stage but the inventor has great hopes and he expects to operate this machine 24 hr. a day for eight to nine months of the year. If these claims work out, you can readily imagine what a splendid revenue will come from this load.

# Industrial Power*

By C. W. SHERMAN
Puget Sound Power & Light Co.

THE INDUSTRIAL power committee was asked to present a report on Diesel competition in the field of medium and small size units. In the limited time we have had, we have endeavored to obtain reports covering the areas served by a number of companies. We have found that very little data are available relative to Diesel competition, and also seemingly very few Diesel engines have been installed.

We draw these conclusions from the fact that this committee is composed of twelve members representing all of the major utility companies in the Northwest. One letter received from a committee member said: "It has been our experience that Diesel engines are not competitive with our power rates in this territory, and they are used only in places remote from our lines or for temporary mobile power units, such as might be used in building, contracting, and mine development work."

The committee presents data on three case histories of Diesel engines which have been installed. We have also included a typical form sheet for analysis of Diesel engine data. It would be well to read at least one case history in its entirety, so that you can have an idea of the material from which the analyses were derived.

We do not believe at the present time small Diesel engines represent serious competition. Nevertheless it would be well to keep abreast of all facts, especially on the newer type of more flexible Diesel units which are appearing on the market.

There is, however, one thing which this investigation has brought to light and which can be taken for what it is worth. This is the hesitancy of Diesel owners to give out any figures, when we might expect, if human nature runs true to form, that the man who is supposedly beating the power company at its own game would shout the news from the house tops. We found that such advertising was very scarce, which leads us to believe that several of the Diesel owners who were contacted, are really taking it on the chin and will not admit it.

* Report of Industrial Power Committee.

* C. W. Sherman, Puget Sound Power & Light Co., Chairman; B. C. Electric Railway Co., J. C. Munro; The California Oregon Power Co., W. J. Moyer; Eastern Oregon Light & Power Co., A. B. Olson; General Electric Co., J. L. Wright; Hermiston Light & Power Co., John A. Clarke; Idaho Power Co., O. C. Mayer; Northwestern Electric Co., R. W. Faville; Portland General Electric Co., A. H. Greisser; Puget Sound Power & Light Co., Lloyd Steele; Utah Power & Light Co., D. H. Hutchinson; The Washington Water Power Co., E. E. Scofield; Westinghouse Electric & Manufacturing Co., M. P. Buswell.

### IDAHO FLOUR MILLS (120 bbl.)

Diesel replaced 90-hp. electric
Type of diesel: 6 cyl., 850 r.p.m. full diesel.
Size and make: 100 hp.
Type of drive: Flat belt

| | | |
|---|---|---|
| Cost of equip: | $3,825.00 | |
| Inst. cost: | 2,150.00 | |
| Bldg. and Found.: | | |
| Total cost | $5,975.00 | |
| Int. on Invest.: 6% per yr. 4 yr. | | $1,432.00 |
| Depreciation: 100% in 4 yr. | | $5,975.00 |
| Max. load: (5 min. aver.) 85 hp. (est.) | | |
| Running Hours: 8,000 total hr. | | |
| Fuel oil: cost del'd. | | $2,888.12 |
| No. of gal.: 26,334 | | |
| B.t.u. per lb. | | |
| Lub. oil: total cost | | 790.00 |
| No. of gal.: 1,117 | | |
| Repairs: Reg. upkeep: | | $ 148.21 |
| Eng. accidents (est.) | | 1,138.00 |
| Auxiliaries, etc. | | |
| Total oper. cost of diesel: | | $11,233.33 |

Equivalent Kw.-hr. 240,000 (Est. from Kw.-hr. per barrel of flour test)
Cost per Kw.-hr. 4.68c (Ex. taxes and ins.)

Data on electric drive previously used on same mill:

| | |
|---|---|
| Highest 5 min. peak recorded: | 87.5 hp. |
| Aver. monthly 5 min. peak: | 79 |
| Ave. monthly load factor: | 24.8% |
| Aver. rate earned per Kw.-hr. | 1.95c |

Have purchased electric energy since breakdown on October 7, 1938.

### UTAH FLOUR MILL (150 bbl.)

Diesel replaced 50 hp.
Type of diesel: 850 r.p.m. full diesel
Size and Make: 89 hp.
Type of drive: Flat belt

| | | |
|---|---|---|
| Cost of equip.: | $3,400.00 | |
| Inst. cost: (orig.) | 600.00 | |
| Inst. cost: (add.*) | 2,455.12 | |
| Total cost | $6,455.12 | |
| Depreciation: ** | $4,705.12 | |
| Running hrs. in 5 yr. 8 mos.: | 26,000 | |
| Repairs: Reg. upkeep | | $2,686.53 |

(These are major items for which invoices were found. Records incomplete.)

Est. equivalent Kw.-hr. 900,000
Approximate per Kw.-hr. costs are fixed chgs.

| | |
|---|---|
| Interest | 0.27 mills |
| Amortization | 5.22 mills |
| Insurance and Taxes | 0.08 mills |
| Total fixed charges | 5.57 mills |
| Operating charges: | |
| Fuel | 5.55 mills |
| Lub. oil | 1.42 mills |
| Repairs | 2.09 mills |
| ***Out of service time | 0.77 |
| Total Oper. charges | 10.73 |

Total cost of Diesel Operation: 1.63c Kw.-hr.

NOTE: (1) No labor costs have been allocated.
(2) No charges for flour spoilage are included in above figures.

* Additional installation cost due to heat from diesel spoiling flour and making necessary the installation of cooling equipment and the building of a new storage room.

** After 5 yr. mo., old equipment was turned in on a new and larger diesel. An allowance of $1,750 was made for the old engine.

*** During shut-down, wheat is milled at another mill at higher cost.

### BRITISH COLUMBIA SAWMILL

Type of Diesel: New, gas start, Diesel run, medium duty
Size and Make: 80 hp. International
Type of drive: Belt

| | | |
|---|---|---|
| Cost of equip.: | $3,600.00 | |
| Install. cost: | | |
| Bldg. and Found.: | | |
| Total cost | $3,600.00 | |
| Int. on Invest.: 6% per yr.: | | per mo. $18.00 |
| Depreciation: 10% | | per mo. 30.00 |
| Maximum load: (15 min. aver.) 60 hp. | | |
| Running hr. per mo.: 200 | | |
| Fuel Oil: cost del'd. | | per mo. $96.00 |
| Lub. Oil: Total cost | | per mo. $28.00 |
| No. of gal. | | 26.7 at 1.05 |
| Attendance: cost of labor at 30c per hr. | | per mo. $60.00 |
| Repairs: Est. at $1.50 per hp.-yr. | | per mo. $10.00 |
| Total operating cost of diesel: | | $242.00 |

Estimated cost of electric drive:

| | | |
|---|---|---|
| Cost of motor: | $744.00 | |
| Cost of starter: | 238.00 | |
| | $982.00 | |
| Interest on Invest.: 6% | | $4.91 |
| Depreciation: 5% | | 4.09 |
| Oper. Cost | | 172.50 |
| Total Operating Electric | | $181.50 |
| Saving of Electric over Diesel: | | $60.50 |

Power cost per, 1,000 board ft. of lumber

| | |
|---|---|
| Diesel: | 61c |
| Electric: | 45c |

NOTE: This installation is due to the cost of making electric service available. The mill is situated where there is no electric service and the costs of building a line were too great in proportion to the expected revenue.

### TYPICAL FORM SHEET FOR DIESEL ENGINE DATA

1. Name and address of plant.
2. Type of plant.
3. Make of engine.
4. Type of engine: 2 or 4 cycle
   Air or mechanical injection.
   Vertical or horizontal
5. Rated power: Brake horsepower
   Kilowatts
6. Engine data: No. of cylinders
   R.p.m.
   Year of installation
7. Driven unit? .....
   Type of drive
8. Total running hours each engine in period covered.
9. Gross output of each engine.
10. Net output of plant.
11. No. of enforced shut-downs: Total hours.
12. Peak load: Each engine
    Entire plant
13. Type of cooling system used:
    Cost of operation:
14. Fuel Oil: Total cost delivered
    No. of gallons used
    B.t.u. per pound
    How bought?
15. Lubricating Oil: Total cost delivered
    No. of gallons used
    a. To replace shrinkage
    b. To replace discarded
    Is oil purified? How?
16. Attendance: Total cost
    No. of men? Rate?
17. Repairs: Regular upkeep material
    Upkeep due to accidents material
    Extra labor
18. Miscellaneous expense, if any:
19. Investment cost: Engines
    Cooling system
    Auxiliaries
    Buildings and land
    Installation
    Misc. expense
20. Is heat from engine exhaust utilized?
    If so, in what way?
21. Altitude of plant above sea level.

# Advertising Committee*

## What's Wrong With Utility Advertising?

By JAMES LIGHTBODY
B. C. Electric Railway Co.

WHEN I began to think of this subject of "What's Wrong with Utility Advertising," it seemed to me that if I thought about all the mistakes of utility advertising, I would finally convince myself that it was in a heck of a mess. So I decided to write down my conviction before I went all to pieces and here it is: "There is nothing fundamentally the matter with utility advertising except the common frailties of human nature." As a matter of fact I spent some time the other day looking over public utility ads from all over this continent and I could not frame any general indictment of them. There are so many variable factors, so many different situations that it is impossible to lay down a general rule that this is right and that is wrong. I did see some ads that I thought were poorly written and wrongly directed and so if you will take these generalizations as having many exceptions I'll give them for what they are worth.

It seemed to me that many of our ads are too crowded with copy. The ads that appealed to me most were exceptionally simple. I realize that there are situations where a simple ad will not do, but there must be many others where a simpler and therefore smaller ad, repeated oftener, would reach more people. Another thing I noticed was the deadly seriousness of our advertising. Just why this should be in a country of wisecrackers, I don't know. Can't we get some sparkle into our advertising?

I suspect that a lot of our advertising is too high-hat. It is aimed too much at the upper brackets. The upper classes have long ago bought electric ranges and water heaters and are enjoying proper lighting. But we do business with people in every level of income and it is logical to aim our advertising for these appliances a bit lower down on the scale.

I would say that in many cases too little real study is being given to our advertising. For example, here are some headings which I selected as being particularly ineffective:

"Wired happiness pays"—I can't imagine any woman going into ecstasies over that one, whatever "wired happiness" means.

"Every woman deserves the best in cooking advantages." That is the old idea that the best is none too good for our women but too many persons have had to grin and bear it for this appeal to have any power today.

"Ease of operation adds to the pleasure of electric cookery." That is quite a mouthful. Can you imagine any woman talking to her friends about this kind of operation?

"Kitchen-proved electric ranges"—whatever that might mean.

"Assured cooking perfection and freedom from the kitchen—that's electric cooking." More big words that are hard for the average person to grasp.

Now let's look at some I like:

"'I find electric cooking is so much easier,' says Mrs. ———."

"'My average cost for electric cooking is only $2.10 a month,' says Mrs. ———."

There's personality about these headings. They strike a homey, chatty note that you will find in most of the food or cosmetic ads addressed to women. The words are simple, such as ordinary people use in conversation and they are not extravagant.

Incidentally, there appears to be unison for the first time in electric range advertising under the slogan that "Electric cooking costs half what you think."

I don't believe we have kept pace with the technical improvements in advertising. We are today competing for attention with national advertising of very great attractiveness. This advertising in the national magazines employs color, photographs, professional models and expert typography. National advertising in our daily papers and the advertising of our best stores also employ excellent halftones. As public utility companies, representing the best in our respective localities, we cannot be behind. We must convince our managements that appropriations must cover production costs which have grown considerably during the last few years.

What else is wrong with utility advertising? Well, what is wrong with all advertising? Much of it has been gross exaggeration, if not actual untruthfulness. There has been a great deal of bad taste and too much high-pressure selling. The government is already taking action to stop manufacturers from making wrongful claims in their ads, which is really doing the advertiser a service because people have been discounting advertising in general. It is up to us to restore people's belief in its truthfulness.

### Weak Advertising

Utility companies will never join the advertisers of "B.O." or "S.A.," but it is possible for us in our particular sphere to be somewhat ridiculous. In some communities it is bad taste to suggest that the ownership of an electric range gives the women more time to play golf, especially when according to the latest Ladies' Home Journal poll, 59 per cent of the men questioned thought women spent too much time outside the home. In the same way, the appeal of paying for the refrigerator with the savings you make has been kidded so much that it has lost the grain of truth it had.

These generalizations that I have given have the weaknesses of all generalizations. They are not true in anything like 100 per cent of the cases; perhaps not in 50 per cent of them. Besides, the advertising picture changes so fast that what is good practice today may not be tomorrow. There appears to be no substitute for good sound common sense. You can't lay down any rule about advertising because the moment all advertising conformed to that rule, it would flop.

I would now like to leave the copy angle and touch on a somewhat different phase of public utility advertising.

First, in too many circles, not only in public utilities but in business generally, advertising has luke warm support from management. The attitude too often is, "Can't we save this money?" This is probably because they don't realize what advertising really is—a means of getting a message about your goods or service to thousands of persons at one time much more cheaply and effectively than could be done by any other means. Advertising is not an expense but a business-getting force. If you believe in promoting your business, you must believe in proper advertising.

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* Advertising Committee: Gilbert L. Stanton, Idaho Power Co., Chairman; John Dierdorff, Northwestern Electric Co., Vice Chairman; The Birchard Co., P. T. Birchard; Bozell & Jacobs Advertising Agency, R. H. Wensberg; B. C. Electric Railway Co., J. Lightbody; The California Oregon Power Co., H. D. Kem; Eastern Oregon Light & Power Co., Leon Gray; Jos. R. Gerber Co., C. H. Devlin; Gillham Advertising Agency, Lon Richardson; Grays Harbor Railway & Light Co., F. W. Linklater; Idaho Power Co., Joe Imhoff; McCann Erickson, Inc., Vernon R. Churchill; The Montana Power Co., D. J. McGonigle; Pacific Power & Light Co., M. G. Kennedy; Puget Sound Power & Light Co., J. Harvey Leach; Strang & Prosser, Wade Thompson; Utah Power & Light Co., M. L. Cummings; The Washington Water Power Co., Harvey A. Brassard; Westinghouse Electric & Manufacturing Co., W. C. Miles.

Second, utility advertising has not been continuous enough. Perhaps it has been because of the lukewarm support advertising has received from managements. They have agreed to advertising when they were in a jam and then dropped it when the danger was over. Of course, if you think that people will remember what you said in an ad a year and a half ago, you are just fooling yourself. These are busy days and people don't carry your pet statements around in their heads. But you can convey an impression and in the course of time build up a reputation and character for your company which will work for you in a time of crisis.

**Our Institutional Advertising**

Institutional advertising has been under a cloud these last few years and we've been guilty with all the rest of a number of sins. We've run "The story of your power supply" in long 500-word ads thinking newspaper readers will read them when there is a good murder or a comic strip competing for their attention. We have boasted about our service and given them statistics which they never read.

I'm not going to say there is any sure-fire type of institutional copy but I do suggest that what our advertising needs is more friendliness. We want to be more human and personal in our relations with the public. The public isn't interested in a power plant but in the people that run it. If some public observer could sit in on some of our internal meetings and see the extent to which our companies go to please their customers, they would have a different impression of us. Why not get some of that atmosphere into our advertising?

What's ahead of us in utility advertising? I see less selling of appliances and more selling of service. With more and more outlets for merchandise many utility companies are getting out of the appliance business. But whether you are in it or out of it, it is the service of the appliance which counts and not the mere sale.

Ahead for utility companies is more straight-forward business-getting advertising, such as commercial lighting, commercial cooking and heating, industrial uses for utility service and so forth. This advertising will need to be more selective and our media more carefully analysed. We will probably need to set up more elaborate organizations for picking out prospective customers because there is nothing worse for the company's standing than sending sales material to the wrong person.

Sometimes too much is expected of advertising. I think it is essential that sales departments and all others in a company who benefit by advertising should understand its function. Whatever it may do in selling staples such as food, drugs, clothing and so forth, which are so often sold on a price basis, it can only get customer acceptance for our appliances or services and then only gradually.

Let me illustrate what I mean this way. Suppose you are sending out some direct mail folders to a list of electric range prospects. It is a mistake for a salesman to call on any of these prospects immediately after the receipt of the first folder. They should resist that tendency because if there is a turndown the way is closed for another call for a long time. Advertising does not work in a one-shot way. It is the repetition that brings success. Don't expect returns the next day from your advertising; nothing so revolutionary as raising the standard of living of whole communities was ever accomplished quite so easily and quickly.

# Sales Promotion and Advertising

By E. R. WOOLLEY
Ebasco Services Inc.

A SERIES of articles in "Printers' Ink" during August and September, 1938, gave the results of an investigation conducted by this magazine to determine the difference between advertising and sales promotion. A definition given in one of these articles will bring out the statement I am about to make, which is that advertising and sales promotion are inseparable. I quote:

"All good advertising is designed to promote sales. Therefore, under a broad definition of the term, advertising itself is sales promotion. On the other hand, most good sales promotion, as the term is used today, is, in truth, advertising."

In order to make sales promotion and advertising effective, it must be localized, humanized and personalized if it accomplishes the purpose for which it is designed. There is real opportunity for real showmanship in the preparation of advertising and sales promotion material. In fact, good utility advertising and sales promotion material is printed salesmanship which influences people to appreciate the value, use and cheapness of utility service.

It is important that we emphasize these phases—the value, use and cheapness of utility service—in all our utility advertising and do not attempt to sell prices and terms which have nothing to do with the use of our electric service. Sales promotion and advertising, being inter-related, should be combined in order to avoid duplication of effort and to control the costs of sales promotion and advertising so our money, spent in these activities, will produce the greatest desired results per dollar spent.

**Advertising Sales Promotion**

It is said that sales promotion and advertising is a tool in attaining sales results and it is my firm opinion that all tools used in obtaining sales results should be controlled by and be a part of the general sales department. My conclusion, therefore, is that the advertising and sales promotion department should be a part of the general sales department, and be a creative and a planning section of that department.

I believe it would be valuable to outline the duties of a sales promotion and advertising staff to the end that we may clearly understand the work to be accomplished by this department. First, the department should be responsible for the sales planning or sales promotion and advertising, and for the preparation of sales training material. Second, it should work closely with residential and farm, commercial and industrial, and Government and municipal sales forces, determining their needs and obtaining their ideas with respect to all phases of selling, including advertising and sales promotion in general, as well as with respect to such phases as home service work, employee sales promotion, and dealer sales development. It should prepare for each of these departments their sales programs, campaign plans and prospectuses, sales promotion material, advertising and sales publicity material, sales bulletins, reports, and sales aids such as manuals, handbooks, sales kits and sales training course material.

This department should be responsible for the coordination and preparation of the company's annual sales budget and annual sales program, assist in the formulation of company sales policies, and be represented at all sales meetings and sales conferences for the purpose of learning ideas first hand from the salesmen themselves. The department should be responsible for meshing and coordinating the sales promotion and advertising program with the direct selling program in order that the two programs may operate harmoniously and toward the same end. It should also be responsible for the relations with and the performance of services by the utility's advertising agency.

The advertising and sales promotion department should be responsible for the design of the company's displays, sales floor and show window layouts,

for shows and exhibits, and for the preparation of designs for other display aids used in the company's dealer sales development activities; also for the clerical, filing and stenographic service of the sales department, including operation of the filing system, keeping sales records, following and insuring the posting of sales budgets, and particularly the accumulation of adequate sales data and basic material on promotion and sale of utility services, as well as the maintenance of such information in a form that is readily usable by all members of the sales department.

The department's duties should include the accumulation of records for analysis of sales performance and sales expense as compared to budget estimates and to quotas for sales campaigns and activities, especially for the use of sales and new business reports of the company's monthly financial and operating report. It should analyse the results and costs of sales campaigns, and make studies of unit sales figures, sales research and analysis of the effectiveness of promotional advertising and selling activities and methods.

I am sure we all realize I have outlined a large order for the sales promotion and advertising department, and an analysis of the duties of these departments as outlined, will readily reveal the reason why the two divisions should be combined into a single department for accomplishment of the desired end.

# Sales Promotion Problems

By MELVIN G. KENNEDY
Pacific Power & Light Co.

SALES promotion departments have three groups of people to convince —utility sales and operating employees, dealer salespeople and, finally, the buying public. I shall attempt briefly to discuss the problem of injecting showmanship into business as it affects each of these three groups.

1—*Utility salespeople and operating employees*—The success of any sales campaign depends to a large extent upon the amount of enthusiasm created among those participating. Prior to each major campaign we try to arouse enthusiasm through "flying circus" meetings conducted by department heads and occasionally factory representatives. These are usually evening meetings to which all employees and their wives are invited and are presented in skit form to secure maximum enthusiasm. In most cases the meetings end with refreshments being served to further a feeling of fellowship, goodwill and enthusiasm.

For sustained enthusiasm no campaign is complete without a sales contest. Every good American likes a fight. When showmanship and conflict are harnessed together in a competitive load building contest, they make a combination hard to beat. After the theme for the contest has been selected, of equal importance is the job of issuing snappy progress reports that continue to pit one individual against the other.

A problem usually encountered here is to secure the approval of department heads in keeping the rules of the contest as simple as possible, as nothing perhaps can slow up a contest more than complicated, seemingly unnecessary restrictions.

The house organ can be of much assistance to the sales promotion department in playing up contest leaders, running pictures and stories to emphasize further the importance of the job at hand.

2—*Dealer salespeople*—Since in most cases it is impossible to remain in as close personal contact with dealers as it is with company employees, much reliance is placed on a dealer bulletin to sustain interest. Our first attempt at a dealer bulletin was in the form of an "Ad-a-log," the primary purpose of which was to transmit preprints of company advertising which was planned for the coming month. This bulletin was gradually enlarged with a shift in emphasis toward sales promotion to convince the dealer of the profit possibilities in selling electrical appliances and to make him aware of his part in the industry-wide sales program. In our own particular case there is still a long way to go in the preparation of a dealer bulletin that will inject showmanship into our dealer contacts, but it is felt that some headway has been made.

Once or twice a year it should be possible to call in dealer people for a sales meeting conducted along the lines of the manufacturers' road shows mentioned before. This would undoubtedly go a long way toward interesting dealers in the sale of electrical appliances.

During times of particular sales emphasis such as our present "Revenue Recovery Drive," we make available to dealers display cards, automobile bumper cards, handout literature, etc., and attempt to sell them on using this material for increased profit. We are careful at all times to emphasize to them the value of such material as we do not wish to establish a precedent of supplying dealer promotional material, but rather hope to build them up to the point where they will take an active interest in securing such material for themselves.

3—*The customer*—No one present questions the value of advertising. Yet I believe you will agree with me that there are times when the old established media failed to do the job and it was necessary to look for new ways of inducing mass action.

Such a problem confronted us in the promotion of radio. As you know, Pacific Power & Light Co. has not merchandised radios for many years, but of course is vitally interested in maintaining a high saturation of this important load building item. Promotional newspaper advertising with whatever dealer tie-ins could be secured, proved inadequate and so we began to cast about for some means of arousing widespread interest in radio each fall and it was finally determined to stage a radio show. The plan finally approved was to secure the largest hall available in each town, urge all radio dealers to display their new models at no charge and invite the public to inspect the new models and enjoy a free radio broadcast.

The first year the show played in two or three towns to fair crowds. The second year the itinerary was enlarged and better radio entertainers were secured. Last year the show played for 28 days in 18 towns served by our company and reached an audience of over 30,000 at the regular performances. In addition some 20,000 persons saw the entertainers at high schools, grade schools, service clubs, etc., where it was presented to build attendance for the regular show.

Everyone likes free entertainment and any show designed to entertain will draw crowds. If your sales story can be woven in unobtrusively, it will secure a surprising amount of direct business plus an untold amount of goodwill.

Another important function of the sales promotion department which no doubt has produced many headaches among those present is that of store and window display. In the smaller company stores common to most of the companies in the Northwest it is seldom feasible to employ a full-time display man and it is therefore necessary to work with whatever manpower and material there are at hand. Some companies are finding it worthwhile to prepare display material at some central point and circulate it among their branch offices. Others are taking advantage of itinerant displays which are beginning to be available in this territory through national sources.

# Rural Sales Bureau*

## Methods of Electric Utilization Education*

By K. W. BROWNING
Utah Power & Light Co.

THE subject of this paper involves many different individuals and groups needing education on the subject, many different agencies who participate in the educational work, and many different methods of carrying on this work. Before we get into details we must start out with some general premises upon which a plan of education can be built. Such a premise is that electricity makes it possible for the farm family to enjoy nearly all of the advantages of city life without many of the disadvantages, and in addition to do so with a profit to the farmer.

I think we all agree that some progress has been made in getting electric service used on farms, though it is not being used to anything like the extent it could be. Grover C. Neff, President of the Wisconsin Power & Light Co., outlines five things which agricultural engineers can do, all of which involve a high degree of educational activity: (1) see that electric wiring is adequate; (3) develop farm machinery suitable for electric drive; (3) bring about the cooperation of farm experts; (4) help develop, promote, and establish courses in schools and colleges; and (5) support the C.R.E.A.

In the first place, whom are we to educate? Our part in educating the farm public is obviously the major issue here; but at the same time we must consider education of our own public utility personnel who contact the farmers, the education of farm organization leaders, vocational agriculture classes, 4-H club groups, and even in some cases agricultural college extension division personnel and experiment station staff. Many of these groups in turn became agencies for education of the public in electric utilization. Any utility which tries to go it alone in educational work is using valuable time and effort to poor advantage. There are other agencies not only able but willing to help with this work. There are the agricultural colleges with their extension personnel, experiment station staff and club leaders. Then there is the class instruction work in the college. There are farm organizations such as the Farm Bureau and grange, Smith Hughes teachers, the manufacturers of equipment, the broadcasting companies with their farm and home hour and similar programs, and even the Rural Electrification Administration. These agencies provide information and educational data directly to the farm. Then, for the information and education of those of us engaged primarily in rural electrification work, there are in addition to the agricultural colleges, the national and state C.R.E.A. and the American Society of Agricultural Engineers.

This is truly an imposing array of organizations and people who can and do participate in the work of bringing to light new improvements and methods of electric utilization. It is necessary for us to cooperate with all of them if we are to function 100 percent.

Now as regards methods of electric utilization education, it seems to me that the method which in the last analysis is the one which really brings ideas home to the farm is that of field contacts by all of the agencies involved, where we get a chance to sit down with the farmer and analyze his own problems. Preparatory to this, however, there are many ways which have been tried with varying degrees of success by farm electrification specialists all over the country. One is the presentation of educational material at meetings of farm groups such as Farm Bureaus, granges, county agents' meetings, poultry and dairy association meetings, groups on new extensions, vocational agriculture classes, and special meetings called for the purpose of discussing farm electrification. Most of the organizations I have just mentioned are usually glad to listen to information about the various phases of rural electrification. Such material should, of course, be carefully prepared with as strong a local flavor as possible and illustrated with movies or slides wherever possible. We are building up a set of slides showing installations in our territory and expect them to be of real help in telling an educational story. Actual demonstrations, carried on in connection with these meetings, add greatly to the interest of the group.

According to a report of D. B. Ebinger, rural electrification specialist, Michigan State College, fourteen special 2-day rural electrification schools were held during 1937 with an average attendance of 300. These schools were put on by the joint cooperation of the county agent, the utility, and equipment dealers. They produced very good results, or at any rate everyone seemed to be well pleased with them. I do not have any data on the cost of the schools, and it is quite possible that the cost may have been rather high.

Some companies have gone to the extent of establishing demonstration farms where all possible processes on each particular farm are electrified. We have considered this method, but for the present at least have decided to work through the agricultural college experiment farms rather than through private farms.

The appliance coach has been used in several localities, and was described in the report of the Appalachian Power Co. in the January "Rural Electrification Exchange." On this trailer coach 45 pieces of equipment were displayed and operated, including both household and farm equipment. Arrangements are made to connect the coach up in front of a meeting hall, where the presentation is made. The coach is equipped with a public address system, and starting about 7:30 p.m. a general invitation is issued over the public address system to visit the exhibit coach and see the appliances in operation. A complete oven meal is then put in the range in the coach and guests are registered for the meeting to follow. The coach is then closed and a 1-hour rural electrification movie is shown in the meeting hall, after which the coach is opened again and a prize drawing is held.

This activity, though it is primarily sales promotional, has a good deal of educational value, particularly if it is properly planned and executed.

Another method is the use of exhibits at fairs. We used this method two years ago, having a tent 25 by 50 ft. and a wide variety of farm equipment which was furnished by implement and electrical dealers. We did not use any household equipment, all the devices being farm equipment. After trying this for one season we have not repeated it because it was rather expensive, and because the carnival rather than the educational spirit seems to prevail at fairs.

* Abstracted and considerably condensed.

* Rural Sales Bureau: Earl A. Olson, Idaho Power Co., Chairman; J. C. Scott, Puget Sound Power & Light Co., Vice Chairman; B. C. Electric Railway Co., S. J. Bowman; The California Oregon Power Co., D. A. Runyard; Eastern Oregon Light & Power Co., R. L. Saling; Idaho Power Co., R. S. Overstreet; University of Idaho, Hobart Beresford; Mountain States Power Co., C. B. Greenough; Northwestern Electric Co., Kenneth Hood; Oregon State College, F. E. Price; Pacific Power & Light Co., C. O. Bunnell; Portland General Electric Co., Ben Faber, L. C. Moore, W. R. Newmyer; Puget Sound Power & Light Co., W. A. Luce, C. W. Wildebour; Utah Power & Light Co., K. W. Browning; Westinghouse Electric & Manufacturing Co., C. E. Klaus.

An educational method which we have been using lately with good success is to give every new customer a written presentation of the possibilities of electric service on his farm. We tried this out using a variety of material bound in a folder. This material includes an introductory letter written personally to the customer by our farm electrification representative, outlining the terms of his contract for service and the electric rate. Some suggestions are made as regards wiring and a blueprint showing a typical farm wiring layout is enclosed. We also include the current issue of "Electricity on the Farm," a copy of the Farmer's Wiring Guide, a booklet on running water, and a booklet covering nearly all other farm services. The more individual and personal such a recommendation can be made the more effective it will be, and this method should prove to be one of the most valuable educational tools at our command.

We have not yet touched upon the education of agricultural students in colleges along the lines of rural electrification. I understand there were last June only three institutions offering a rural electrification course to the agricultural engineers in their degree courses. There may be more than three at present, but certainly the majority of agricultural colleges are not making this a requirement for a degree. There are as many farms with electric service as there are with tractors, and nearly every college agricultural engineering department has one or more tractor courses. A rural electrification course is certainly just as important. In most states, the percentage of agricultural college students from electrified farms is far higher than the percentage of electrified farms. Farm power and machinery courses should at least recognize the present and potential use of the electric motor as a power unit, and in addition, there is big potential demand for men with training in rural electrification not the least of which should be a demand for agricultural engineers with special training in the field of college teaching.

The most important educational project which we have under consideration in our territory at the present time is the electrification of a number of pieces of equipment and processes at the agricultural college. This project contemplates the installation of about 25 pieces of electric farm equipment and some additional lighting equipment at the dairy experiment farm, cattle feed yards, hog barns, poultry department, and horticultural department. The college staff has indicated the desire to cooperate fully in getting this equipment installed and used, and in securing reliable unbiased data on its operation. We expect the following advantages to be derived from this project: (1) The equipment can be used by the regular engineering classes and will have great educational value for them; (2) it will be exhibited and demonstrated to the meetings of many farm groups; and (3) it will supply a wealth of valuable and very reliable data for our farm electrification manual and other educational publications.

This brings us down to another educational method—the use of the farm electrification manual in my company. An outline of the contents of the manual was made and some of the sections were completed in 1936. Additional sections were completed in 1936. Additional sections were issued in 1937, but there are still a number which have not yet been completed. We plan this year to complete it and to revise some of the present sections. Two hundred eighty-five copies have been issued, less than half to our own organization and the balance to agricultural leaders in our territory and adjacent states.

After using the manual for two years we have found that first it is indispensable in the education of farm leaders in the most efficient utilization of electric service on the farm, and, second it has been invaluable in training our own personnel, some of whom had had no previous experience with rural electrification. When we revise and complete our manual we shall use local data and local installations wherever possible thereby increasing the effectiveness of the book in our territory.

The last educational method in our long list is the use of sales promotional publicity. The last piece of printed material which our company issued is a folder entitled, "More Eggs—More Dollars and Profits with Low Cost Electricity." It cites the advantages of electric brooders, laying house lights, yard lights, drinking water warmers and ultra violet lamps, and is now receiving wide distribution to our poultry and egg producers. Sales promotional publicity is particularly valuable in connection with new uses of electric services. One example of this is the mimeographed sheet which we issued this spring showing how to build an electric pig brooder. This has resulted in the construction of about two dozen pig brooders within a few weeks after it was issued and many more will undoubtedly follow.

We distribute about 3,000 copies per month of "Electricity on the Farm" among our 16,000 farm customers and the mailing list is revised frequently. All members of our own organization who are directly interested in farm electrification work receive in addition the "Rural Electrification Exchange" and the CREA publication.

As example of the work in utilization education being rendered by the five full-time farm electrification experts on our system, I would like to refer to their last monthly reports for February. The first man made 18 calls on equipment dealers, five on county agents, six on agricultural college personnel, and discussed electric services in four poultry meetings and two farm bureau meetings. The next one contacted 14 equipment dealers, three agricultural leaders, developed a new type of pig brooder, and made written presentations to five new farm customers on extensions. The next one contacted five dealers, seven agricultural leaders and took a group of poultry producers to the agricultural college for a demonstration and data on electric brooding of turkeys. The next one contacted all county agents in his division and several Smith Hughes teachers. The last man contacted 19 dealers and three key agricultural people.

These five men made a total of 532 farm contacts during the month of February, and this is a much poorer month than normal, both for farm contacts and for educational work due to the impassable condition of many of the roads. In the course of a year these men spend considerable percentage of their time on educational work both with groups and individuals.

There are two subjects in particular upon which we need more data: (1) the use of ultra violet light on both poultry and dairy farms; and (2) the use of insect traps. I think we all agree that experimental work on these subjects in order to have any value must be very carefully done and supervised by someone commercially disinterested. Both of these electric services have great profit possibilities for both the farmer and the electric utility, and any one who can contribute any data on them will be rendering a real service.

# Selling Electric Farm Service

By E. R. WOOLLEY
Ebasco Services Inc.

A REVIEW of statistics from the group of companies with which I am associated, will indicate the substantial progress that has been made in rural electrification in the past few years. In 1930 our group of companies served 57,000 farm custo-

mers. In 1938 they served 126,000 customers, or a gain of 122 per cent. During this same period, the miles of rural lines increased 200 per cent. In 1934 there was an average of 6.7 customers per mile, while in 1938 the average had fallen off to 4.3 customers per mile. An examination of the construction costs during the four year period shows that the average cost to serve a customer on new lines constructed was $224, while on lines already established it was only $60 per customer.

It is interesting to note that the amount of revenue received from the customer on the new line or the existing line was approximately the same, and during this period only 38 per cent of the new customers were obtained upon existing lines, while 62 per cent of the new customers were obtained on the new lines. In terms of money spent to serve these customers, 14 per cent was spent to obtain 38 per cent of the customers, while the remaining 86 per cent was spent to obtain 62 per cent of the customers. It is readily seen that it costs more money to get new customers on new lines than on existing lines, and that the revenue received from each customer is approximately the same.

Another point discovered in this survey was that the number of non-farm customers has decreased 50 per cent from 1935 to 1938. This classification includes residential customers living in the rural area but not obtaining their livelihood from the property on which they live. This is one reason why the extension into new rural territory will not be so productive as in the past.

The use of electric service on the farm does not depend alone upon the availability of the service. It will require continual sales effort to increase its use by present farm customers before the real value of electric farm service can be appreciated by them.

Each utility sales program should recognize the farmer's problem and have definite objectives to be accomplished by such a program. Some of these objectives are: understand the farmer's problem and his needs; educate youth in the desirability of farm life when supplied with the modern comforts of electric service; sell to protect the farmer's investment and to increase his income; investigate and prove the many savings brought about by the use of electric service on the farm; promote the use of those services most needed by the farmer; sell service on the basis of actual predetermined profits; and help reduce customer's investment in wiring and equipment necessary for adequate use of service. These all may be summed up in a single statement: It is our job to help the farmer help himself.

In order that we may reach the objectives just mentioned, it is necessary that we have a continuous sales program which will assign definite responsibility for obtaining new business and helping old business; provide well trained man power; have a written program; have up-to-date market analyses and survey information; provide sales aids, such as handbooks, sales manuals, etc.; provide close cooperation with sales promotion and advertising; establish sales schedules and quotas; cooperate closely with all sales allies; plan to increase the use of electricity by the low-use customer; and concentrate on increased use of existing equipment and, above all, we must control the costs of such a program.

No utility farm sales program can be geared intelligently to the actual conditions until those actual conditions are fully understood. This is true not only of selling utility electric farm service, but it is true of all classes of business. Unless the market is thoroughly analyzed and facts obtained regarding its conditions, we cannot expect to meet the requirements of that market. Also, we must continuously gather facts in order to keep ourselves abreast of the times and meet new conditions as they arise. In order to develop a market of this type successfully it is essential that we have a long-range program which will extend over a period of years. In other words, we must know all the fundamental facts before starting on any sales program.

The Texas Planning Board reporting in May 1937 on the "Markets for Texas Hydro-electric Power," found:

"The four major limitations in the use of electricity on the farm, in the order of their importance, are: (1) ability of the farmer to finance the purchase of electric appliances; (2) the inability of most farm users of electricity to effect actual savings in farm operating costs; (3) the amount the farmer can afford for monthly electric bills; and (4) the competition offered by other types of appliances not using electric power."

A questionnaire to a number of regulatory commissioners found the most important problems in connection with rural electrification to be: first, cost of construction; second, the ability of the farmer to buy equipment.

A report of the U. S. Department of Agriculture brought out the fact that approximately 500,000 families are now living on land too poor to make a living on; that there is a migration from rural areas to urban areas, and from urban areas to rural areas of approximately 3,000,000 persons each year; and that on farms in this country there are 2,865,000 tenant families embracing a population of 13,000,000 people. It further points out that rural poverty was not an outgrowth of the depression, but the depression merely showed where that poverty was.

There are many risks in farming, as there are in all businesses, and any electrification program should consider these risks. Probably the most hazardous is weather, but there are others, as insect pests, crop diseases, long time financing of capital employed, and that each year from 7 to 10 per cent of all farms are failures. In addition to these risks which are so important in planning any program, the program should also consider what the farmer wants and what he can afford.

A survey of the companies with which I am associated showed that since 1930 the revenues from farm lines have increased 67 per cent, while the customers have increased 122 per cent and the miles of line constructed have increased 200 per cent. These are very significant facts to be considered in the further development of rural territory. Further, in comparing 1930 with 1937, revenue from farm service decreased 26 per cent per customer, and kw.-hr. decreased 34 per cent per customer. This decrease is clearly the result of extending lines into thinner territory where the number of non-farm customers, as compared to farm customers, was constantly decreasing.

The farmer's income is an exceedingly important factor and must be considered. The U. S. Department of Agriculture, in its report of the most recent five-year period, 1932-1935, points out that the average farm cash income in 1932 was only $230, and in 1935 was $570. Other interesting figures (for 1934) are that 18.4 per cent of all farms lost money; 58.1 per cent earned less than $500; 78.4 per cent earned less than $1000; and that 54 per cent of the farmer's cash income is required to operate the farm, not including the farm home.

The cost of wiring and of appliances is a limiting factor in the development of farm use and, over a four-year period in our companies, we have found that an average investment of $157 is required by a new customer before he can begin to use our service, and that an average investment of $600 is required if the customer is to get beyond the low-use stage.

# Developing Farm Load

By EDMUND E. WALKER
B. C. Electric Railway Co.

WHEN we undertook a specialized effort to build farm load in 1932, our distribution lines left much to be desired and this proved a handicap in giving prompt service. It was decided to make a complete survey of the existing lines, coupled with a canvass of all consumers en route, in order to ascertain the electrical equipment in use and find out what prospects there were of installing other devices. This work took approximately twelve months and was executed in such a manner that the branch offices can now continue to make distribution inspection reports for the engineering department, which saves our sending an inspector from head office as heretofore had been the practice.

White prints of the distribution system are furnished to our branch offices, showing all the customers connected, together with their account numbers and, as additions are made these are noted on the plan and every six months they are sent down to head office to be brought up-to-date.

The survey resulted in disclosing a large number of prospects for farm equipment, and, as we do not merchandise, except electric ranges, refrigerators and water heaters and some smaller appliances, the prospects for farm devices were referred to the manufacturers of this equipment for follow up.

Under the heading of promotional activities, we had a series of weekly radio farm broadcasts, in which the University of British Columbia participated to the extent of supplying speakers. This series was commenced in the fall of 1934 and covered a period of twenty-six weeks the cost ranging between $1,500 to $2,000. It was repeated in each of the next three years.

We felt a change was necessary in the fall of 1938, and we sought the cooperation of twenty of the community centres. We arranged an evening consisting of a lecture by one of the university professors relating to such subjects as dairying, poultry, animal husbandry and horticulture, together with an educational film. The meetings are held in local community halls and we carry with us complete, temporary lighting equipment to supplement the existing lighting in order to demonstrate the effect of a better lighting installation in each of the halls visited.

Our agricultural men take a keen interest in the local annual fairs and are in demand as judges for the particular work which they have studied and in which they have specialized. They cooperate closely with the dealers in farm equipment, and also make farm wiring diagrams. These are submitted to our head office, where a finished tracing to scale is made upon which the electrician is able to quote for doing the work.

Our men are supported with good publicity in the form of a monthly magazine entitled "Farm Service News"; the rural newspapers, which carry regular advertising; billboards, located in strategic places; and special pamphlets which we issue from time to time.

At the Vancouver Exhibition, which is the main agricultural event of the year, we make a special display, the details of which are covered in a folder which is available to any person interested.

# Selling Rural Lighting Service

By WALTER E. POTTER
Incandescent Lamp Dept. of G. E. Co.

LIGHTS have been first on the list of things electrical for farm from the time electricity was first provided, and are today considered first among discussions and conversations at rural meetings, parties, grange meetings and other places where farmers congregate. But because light does not come in a unit, like a pump, a radio or a range, the farmer and his wife need help and advice from the utility if they are immediately to enjoy the benefits of modern lighting and avoid the inadequate lights that the majority of city folks have grown up with.

Here are things that the farm family does not fully understand as yet about lighting: (1) The extent to which good light can protect eyes, lighten tasks and beautify the farm home; (2) the degree to which light can benefit the farmer in his business of farming just as it benefits city men in their business. And, learning these things, they are still at a loss to obtain those benefits of lighting unless specialists tell them: (1) What kind of fixtures and lamps they need and where to place them to obtain the quality of lighting they want; (2) what size lamp bulbs they need to obtain the amount of light they want, and (3) where to buy the things they need and how much they cost.

During the past few years, working with utilities, we have contacted hundreds of recently electrified farms, and seen proved over and over again that (1) when a farm family has been shown the benefits of good lighting and shown how to obtain it, that family is quick to take action and eager to express its thanks for the service rendered by the utility; (2) good lighting which yields the farmer so many initial benefits can be provided with so small an initial investment that it is within the immediate reach of all electrified farms; (3) the utility which helps a farmer obtain good lighting, first achieves an immediate profitable load in the higher rate brackets and has not caused the farmer to make any large capital expenditure as yet.

Providing good light for the farm is, of course, a two-barreled educational and selling job. There as in the city we have the advantages of home lighting in which the farmer's wife is primarily interested and the advantages of commercial and industrial lighting applied to the farming business in which the farmer is interested.

It is, therefore, important that the rural representatives be kept constantly informed on the newest developments in farm lighting and supplied with these facts which makes it easy for him to present the advantages of light to the farmer.

The rural representative notifies the home service advisor when an extension is about to be put through and the home service advisor calls at the farm home and gives recommendations at a time when the farmer and his wife are most receptive to suggestions. At other times, the home service advisor improves the lighting service of farms already electrified through personal calls and demonstrations at group meetings. This combination of a home service advisor and a rural representative working cooperatively forms the basis for the utility's most productive personal contact with the farm home and farm business. This is true in building lighting load on farms just being electrified and farms already electrified.

Among the more important types of tools which are most directly useful in farm lighting sales are: (1) Visualizers for dramatizing both residential and farm uses of services as mentioned above; (2) lighting demonstration equipment, through the new inexpensive lines now offered by many manufacturers. Several manufacturers' catalogs now offer better light-better sight equipment in unit packages for the complete home. (3) sight meters; (4) check charts for lighting operations, and (5) magazines and newspaper articles relating to farm and home making.

# Engineering and Operation Section*

## Introductory Statement

THE sixteenth annual general meeting of the Engineering and Operation Section was held in the Olympic Hotel, Seattle, April 19-22, with A. Vilstrup as chairman. Total registration for this meeting was 218, of which 135 came from outside the city of Seattle. In addition to this number were 22 ladies.

Sandwiched between the technical sessions, and on Saturday, April 22, there were inspection trips to many nearby points of interest, including the new wind tunnel at the University of Washington, and Bremerton Navy Yard. The annual dinner was held Friday evening. Much of the entertainment was provided by talent from Puget Sound Power & Light Co. In charge of arrangements was J. Hellenthal, who headed a committee from his own company and from manufacturer and jobber representatives in Seattle.

At the opening session Wednesday morning, greetings were offered by S. P. MacFadden, vice president, Puget Sound Power & Light. He asserted that engineers had been largely responsible for the development of the electrical business in the Northwest to a point where, in some respects, it was the envy of the rest of the country. Even greater problems exist now, however, and it is important that the engineers recognize them so that engineering brains can be applied to their solution. LeRoy A. Grettum, Association president, responded to these remarks (abstract follows.)

Following this opening, technical sessions were held all day Wednesday, Thursday and Friday, with a half day allotted to each committee. In addition, the Accident Prevention Committee held a special session on Wednesday afternoon concurrently with the general session. Reports and discussions presented at these general sessions are printed hereinafter. Two of them were printed in the April and May issues of ELECTRICAL WEST. All papers published or to be published are listed in the table of contents, page 71. A summary of the sessions follows.

From sessions of the Accident Prevention Committee, Wednesday morning and afternoon, R. S. Maxwell, chairman, four papers are published. In addition, at the afternoon session, there was presented a paper on reclaiming and testing of equipment by S. C. Lindsay; a motion picture on the hazards of kite flying, produced by Portland General Electric Co. and presented by Chester W. Jarrett, and a general discussion of safety problems. In the statistical report by D. W. Prairie, only the summary is published.

The general session Wednesday afternoon was given over to the Utilization Committee under chairmanship of Walter Brenton. The illumination subcommittee, chairmaned by F. H. Murphy, presented four subjects, one of which, that on "Color Temperature Control in Photography" by Chester W. Jarrett, is being held for publication later. E. E. Walker, chairman of utilization devices subcommittee, offered five subjects, one of which was published in the April issue of ELECTRICAL WEST, entitled "Single Phase Arc Welders" by A. C. Kelm and Corbett McLean.

The Power Production Committee, with O. L. LeFever substituting for E. H. Collins, chairman, presented its program of two subjects on Thursday morning and added a report of the systems engineering subcommittee, of which Mr. LeFever is also chairman, that on "Load Control in Inter-Connected Power Plants and Systems" by M. L. Blair.

In the afternoon the Electrical Equipment Committee, Joe Hellenthal, chairman, presented the other subjects under the Systems Engineering Subcommittee, and the reports of its other three subcommittees. Under meters and services with A. H. Kreul as chairman, a report by J. H. Stayner on "Energy Diversion Encountered with New Sequence Meters" was presented but will not be published. One other report of that committee is published herein. The apparatus and design subcommittee under John Bankus, chairman, and the operation and maintenance subcommittee with J. S. McNair, chairman, followed with three subjects each.

In the program of the Code Committee, Friday morning, M. T. Crawford, chairman, Major H. S. Bennion of Edison Electric Institute, discussed "Balanced Load Building," published herewith. As one of the three subjects covered by the Code Committee, a sound film on wiring with CNX-type material was presented through the courtesy of the Omaha Electric League.

The afternoon session on that day was given over to the Transmission and Distribution Committee with R. J. Davidson, chairman. Five subjects were presented, one of which, "Common Neutral on Distribution Circuits" by Corbett McLean has been published in May.

The volume of material and space limitations necessitate some condensing of reports and discussions published.

## Responsibilities of Engineers*

By LeROY A. GRETTUM
President of the Association

THOUGH I know this is an engineering meeting, I think it will not be inappropriate to refer to problems discussed by the Business Development Section in Portland last month. The slogan of that meeting was "Power to Sell," and two important ideas crystallized there: (1) Even though we have high average use at low average cost in this territory, we are far from through with the selling job; (2) Although the territory is well supplied, we have Bonneville and Grand Coulee coming on with large additional capacities. Existing utility sales and promotion organizations are the ones best suited to find a market for these increases. We will find a way to sell these added kw.-hr.

We could well take as a motto for this meeting, "The Power is Ready to Use," meaning that our existing facilities are available and will be ready day or night for the load the salesmen may create. Our chief problem is to convince the man on Main Street that a good job has been done and that we are prepared to continue the job better than anyone else could do it.

This involves, as far as engineers are concerned, the problem of putting the end results of our work favorably before the people. Let us not forget those

* An abstract.

* A. Vilstrup, B. C. Electric Railway Co., chairman; Paul P. Ashworth, Telluride Power Co., vice-chairman; The California Oregon Power Co., J. C. Boyle; Eastern Oregon Light & Power Co., O. D. Lanning; Grays Harbor Railway & Light Co., W. S. Hill; Idaho Power Co., H. M. Jones; Northwestern Electric Co., O. L. LeFever; Pacific Power & Light Co., R. J. Davidson, H. H. Schoolfield; Portland General Electric Co., Walter Brenton, C. P. Osborne; Puget Sound Power & Light Co., M. T. Crawford, J. Hellenthal, R. S. Maxwell, G. E. Quinan; Utah Power & Light Co., H. H. Krueger; The Washington Water Power Co., E. H. Collins, J. B. Fisken; West Coast Power Co., Henry Berk.

marvels of precision and safety so common to us, that are not readily appreciated by the people who get the benefit of them. As an example, the electric meter is a marvellous precision instrument, an outstanding achievement of mechanical and electrical art. The burden of explaining the technical end of the business rests on our shoulders. We must find the means of expression to make these things clear to the layman.

There has been a high degree of cooperation between the manufacturers and distributors of equipment and utility people who use it. With speed and certainty the manufacturers have developed new equipment in their laboratories and have made it ready for general use. The utilities should be just as prompt in giving this equipment its trial in the field to help in this development. Developments in transmission and distribution are approaching in which we in the Northwest should take the lead. Manufacturers can't do it all in their laboratories.

Engineers have been charged with contributing to technological unemployment. If we look back over the years, we find the number of people in industry increasing in spite of labor-saving developments. If we continue making kw.-hr. cheaper to produce and distribute, when men are thrown out of some old occupation, new fields of endeavor will spring up to absorb them.

Let us continue to do what engineers are qualified to do—put the raw products of nature to effective use and continue to extend their usefulness. In this way we will live up to our obligations and exceed our accomplishments of the past.

# Building Balanced System Load

By Maj. H. S. BENNION
Edison Electric Institute

STOCK in trade of the central station business is diversity of load. As a general rule, good load factor and a healthy net income come about when there is good balance among industrial, commercial and residential loads, and when a balance exists in rate structures as ascertained from time to time by reasonably accurate cost—allocation studies.

The three classes of loads should be kept in balance as to percentage of kw.-hr. sales, as they combine to give the best possible system load factor, and as they combine each to pay its full share of the system revenue. The load components within each class should in turn be balanced. The further the three classes are out of balance the more important the internal balance of each class becomes.

There is considerable latitude within which a balance can be worked out to produce profitable loading. The following is an example, for a system with relatively few rural customers, of a load well balanced from the standpoint of a company's finances. If, after excluding sales for street lighting, street railways, sales for resale or other large sales contracts which must stand by themselves, 50% of the kw.-hr. sold go to industrial and to large commercial customers having installations over 25 kw., 25% go to retail commercial customers, and 25% to residential customers, and if the rates are so adjusted that the industrial and large commercial class produces 25% of the gross revenue from the three classes, the retail commercial customers produce 25%, and the residential customers 50%, then it will be found that each class will be producing its full share of the revenue, and the system will have a high daily load factor. If the three classes of service together are earning, say, 6½% of the investment in facilities rendering this service, it will be found that the residence load will be earning about 6% on its share of the investment, the industrial and large commercial load will be earning about 6½% and the retail commercial service perhaps 7½%.

In many areas it of course would not be possible to get the particular balance shown in this example because of the nature of the existing and potential market for electric service. Many electric utilities have little opportunity to obtain industrial load. Some have unbalanced loads because of the unusual industrial growth in their territories. Others have a large proportion of rural service.

At present, many utilities do not have a well balanced, profitable load because of the drive that has been made in recent years to build up the residence load so as to render further rate reductions in that class of business feasible. If you will examine the financial reports in Moody's *Public Utilities Manual* for a period of years, you will find that many of the companies with satisfactory earnings statements are not the ones that have made outstanding progress in building residence load. Some companies that have pushed the residence load have failed to keep up a proper balance by corresponding sales effort in the commercial and industrial fields.

Though it may be infeasible to approach balance among the three principal classes of service, it is safe to say that practically all utilities can, with intelligent study and well directed effort, do a *better* job of profitable balancing.

### Accomplishing Load Balancing

The following observations on load balancing are based on actual experience in maintaining a company's net income throughout a rate reduction program of large proportions over a period of years. The plans were worked out in advance to accomplish this result, and they were successful. The proceeding worked out very closely as planned.

It is desirable for a system to make a reasonably accurate analysis of: (1) residential and retail commercial customers classified according to their use of electricity; (2) the load characteristics of various kinds of load-building appliances and devices, and (3) allocation of system costs among classes of service and to some extent for important loads within each class of service.

In making cost allocations, most careful consideration must be given to the basic assumptions, for these largely determine the outcome of a study, and, if a study is to be of value, they must be as nearly in conformity with realities as human judgment can make them.

In the residence and retail commercial fields, customers should be blocked into suitable ranges of use so that each use class may be considered separately in studying proposed rate changes and in planning sales programs.

In the residence field a company should know the load characteristics for each of the following loads or groups of loads: lighting and small appliances, refrigerators, electric ranges, water heaters and oil burners, or any other significant appliances in use in the territory. In the commercial field similar studies should be made of characteristics of the following loads: lighting and small appliances, ventilation and air conditioning, refrigeration, cooking, water heating, and heating, exclusive of cooking. This information should then be studied to see what saturation of each class gives the best use of plant facilities and therefore where sales effort should be directed.

It should be possible to compute just how many electric ranges can most profitably be added to a system load, and how many water heaters should be sold to balance them, to what extent sales effort should be concentrated on residential lighting, on commercial lighting, ventilation, cooking, refrigeration, water heating, etc.

In the industrial field, lighting affords the best opportunity for load balancing. In general, this load has been overlooked. Those companies

which are pushing it are reporting extraordinary results from the effort. Infra-red heating is now an attractive possibility and is doubly valuable because it also can be used for load-balancing purposes.

The problem of load balancing is a never ending one. New loads and loss of loads make it necessary to do the job all over again. As a general proposition, electric utilities must take loads, like air conditioning, and then direct their effort toward balancing this load. So far as practicable the load in each industrial and large commercial plant should be balanced and the larger the establishment the more important this becomes.

#### Balancing for Depression Periods

Not only should loads be balanced for profit in ordinary times, but also management must build rates and sell load with a thought for balance in periods of depression. This applies especially to industrial rates. Next in importance are commercial rates, and to a lesser degree residential rates. Having in mind a depression, careful consideration must be given to any reduction in minimum charges and any change in the top blocks, both on the high tension and low tension side.

#### The Small User

Financial wellbeing of a company depends on skilful, sustained attempts to build up the low-use customer. At present, this is accomplished most practically by selling lighting and those appliances which cost least for the amount of electricity they consume. The aim in rate reductions should not be to give anything to the lowest-use customer but to make more attractive his greater use of available service.

#### Balanced Sales Effort

The following figures derived from actual experience deserve thoughtful consideration. A rate reduction of $500,000 is divided equally among residential, commercial and industrial classes of business. To get back the $100,000 cut in residential business it is necessary for someone to sell $2,000,000 worth of appliances. To get back the $200,000 cut in commercial and industrial business it is necessary to sell $1,600,000 worth of appliances. To get back the original rate of return on the old capital in the system plus the new capital required as a result of the rate cut, it is necessary to sell $8,000,000 worth of domestic appliances and to sell $6,400,000 worth of commercial and industrial appliances.

These figures show what an enormous merchandising problem is involved in load building. They also show that much bigger returns can be had at the present time from effort in the commercial and industrial fields than in the residential field.

Companies that have recently made rather severe rate reductions report that they are now putting much more sales effort into commercial and industrial business to get back their revenue than into residential business. They also report unexpected success in building up their commercial business.

Time was when margins of profit in all types of business in the United States were much wider than they are today and when the expansion of industry, commerce and population was at a much more rapid pace. Under those conditions, mistakes in judgment were soon outgrown, and unwise decisions were shortly offset by favorable turns. Conditions now require more skilful management and wiser application of experience. Surely a well-engineered company, one that has practiced profitable, balanced load building, is in the best position to stand financial and political stormy weather and to give its investors and customers the most for their money.

Balanced load building requires the soundest kind of engineering. Great advances have been made during the depression in generating and distributing power; the engineers of the manufacturers have not been idle. The engineers of the utilities must now do their part. They must have the problems of the sales manager, the rate maker, and the general manager clearly in mind. Thus will skilful handling of capital be brought about. And that, after all, is the essence of engineering.

# Accident Prevention Committee*

## Injury Experience

By DONALD W. PRAIRIE
Northwestern Electric Co.

THE task of summarizing personal injury experience of the reporting companies for 1938 is much more pleasant than it has been for the preceding years. All but two of the 13 reporting companies show a reduction in either frequency or severity rates, or both.

Fatalities dropped from 12 to 10, and the total number of days lost was 66,389 as against 87,527 in 1937 - better than a 24% drop. This is in the face of an increase in the chargeable time by approximately 28%, as was pointed out in the introduction. The frequency rate dropped to about 72½% of the 1937 high.

The actual statistics are: 453 accidents in 1937 and 328 in 1938. The 27½% drop in severity and 28% drop in frequency were accompanied by only a 2½% drop in man-hours' exposure. However, we are still almost 24% above the 1937 national average in frequency and 20% above in severity, indicating much work yet to be done.

Careful study of the bad spots on our record will show where the most effort should be expended. The "Cause" classification shows that the ten fatalities classified were caused by "man-failure." Two of them indicate supervisory responsibility, and the balance indicate faults on the part of victims. These ten men are nothing but statistics now, and here is why they appear as number 6,000 in the days lost column:

1. Inattention to the work at hand (3 deaths)
2. Poor judgment (2 deaths)
3. Inadequate instruction or training.
4. Negligent working practices
5. Disobedience of rules and instructions
6. Improper clothing or apparel
7. Unclassified (1 death)

Next we should pay attention to who these men were before they acquired the number 6,000.

Seven of them were highly skilled men, consisting of one man in a supervisory capacity, one wireman, and five linemen. *Half of our fatalities were linemen.* In the past 6 years, of 54 fatalities, 32 have been linemen. The direction of effort is clearly indicated with respect to the occupational hazard elimination and preventative training. Many men engaged in the hazardous occupations have no chance to learn from their own experience,

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but those who take their places are given the opportunity to benefit therefrom. That benefit is made available by such studies as this.

If these records were studied by every superintendent, foreman, and workman as diligently as by the compilor, there would be a clear conviction in their minds that almost every one of our accidents is avoidable.

## Discussion

R. S. MAXWELL commented on reported accidents as follows:

*Supervisory Responsibility* was emphasized during the year with good results. We should stress employee instruction. *Discipline* has generally been good.

*Working Practice:* Some accidents have resulted from contributory negligence—mainly new men or young men seeking to accomplish a lot of work.

*Poor Judgment:* We killed a man under this classification this year. We have to make the men realize their individual responsibilities. Sometimes it is not wholly the responsibility of the man who gets injured. Others on the crew may know that this man shouldn't have been where he was and should have warned him.

*Disobedience:* There has been little disobedience and no intemperance. Man is his brother's keeper in accident prevention work, and if there is frequent disobedience, we can and do fire the man.

*Improper Clothing* is really a function of supervisory responsibility. The foreman should see that the men's clothing is suitable to their work. *Carelessness of Fellow Employees* also reverts back to supervision.

*Occupational Classifications:* We have shown an improvement in the construction and maintenance fields and in generating stations and substations. The transmission and distribution classification is still our most hazardous field.

# Bonus Vs. Penalty

By E. E. BECK
Idaho Power Co.

TO obtain the best results from a safety program, should we pat a man on the back for a good job, safely done, or say nothing and discipline him for his mistakes?

A bonus can be given in many different ways. For instance, a good word, a badge or a safety card. The winner of any contest receives some form of bonus. He may receive an increase in salary or personal mention in his company safety bulletin, or he may be lauded before a group of employees. He may even receive a citation or a medal and all the newspaper publicity that goes with it, or a substantial promotion.

A bonus of any kind is pleasant. The donor is honored by the privilege of presentation and the recipient appreciates the recognition. An atmosphere of good fellowship prevails. Everyone is in a good humor and as the message is passed there is a spreading of good fellowship among the employees. Certainly, that is something to strive for.

Bonus has its place in our lives from babyhood to old age. An example taken from school-boy age can easily be changed to a picture that fits you and me. My father, teaching in the backhills country of Ohio, found a boy not attending school because no one could break him of chewing tobacco. Father asked the boy to come to school and bring his own cuspidor which he must clean each night. Father asked for and received the approval of the other pupils. That boy came, he was a good pupil, and today he is a very useful citizen. That was bonus in another form.

I have cited the example to emphasize that after this bonus was applied the responsibility of it rested on my father. Once we grant a bonus a greater responsibility rests on us because the giving of any bonus is a recognition of the facts that precede the giving. This statement in turn emphasizes the necessity for very careful judgment.

Penalty or discipline may be given in many different ways. It may be a correction such as, "Don't grab that crossarm brace, it may be loose and let you fall. Put your hands around the pole." Or it may be the taking away of a badge or safety card. The reason for taking disciplinary measures might be of such nature as to draw publicity in your safetv bulletin publication or be a topic for discussion before employees. All of these penalties are graduated in severity, but in the end we reach the classification of demotion, lay-off or discharge.

A general statement often made, is this—"Our men are being paid to work safely, so why should this become a subject for comment when they are doing just what they are being paid to do."

The reaction to a penalty is varied. Here is an example of one man's reaction to ordinary discipline. John was always late to work on Monday morning. To correct this his foreman talked to him as follows: "John, I would rather put a green man under your charge than any other man in the crew." After some discussion, John was also told that the foreman had noticed he was late for work each Monday morning. Now, John went home and told Mary, the wife, that the "Boss thinks I can handle green men better than any man in the crew." John didn't tell Mary about being late for work each Monday morning, but he wasn't late any more. I cited the above example of mild penalty to emphasize this statement: We always advance when we spice our discipline with a dash of commendation. When we resort to the more severe type of penalty and lay off an employee, it is because that employee does not respond to disciplinary measures and his services are not necessary for a time. When an employee is discharged, discipline no longer enters the picture.

When a penalty is applied, the good fellowship I spoke of a few moments ago is not the natural result. The effect of the penalty on the individual is based largely on that individual's reaction to a mental query, "Is the boss playing fair?" Again, whenever a penalty is applied, in any of its forms, we admit to full knowledge of the conditions up to that point. Beyond that point our responsibility is even greater. The continued responsibility of the original job is still ours, to which now is added the responsibility for the reaction of the individual to our penalty. From the application of either bonus or penalty, the reaction we expect is increased safety consciousness on the part of the individual concerned and of the other employees.

So far I have talked of both bonus and penalty and given you some reactions to each. Some of my statements are merely opinions and might be considered controversial, but here are a few facts: Based on National Safety Council records, more power companies follow the bonus scheme than follow the penalty plan. Among strictly transportation companies the bonus plan is favored, with the exception of railroads, which follow the penalty system. Here is one outstanding fact I find from my investigation: Those companies and organizations which use a strong penalty system win the contest prizes.

In the beginning I recited examples, reactions and opinions; and following this, facts from investigation. Conclusions will follow, but before I start drawing conclusions, let me emphasize a condition which in my opinion has developed beyond the growing pains of a mere movement to the proportion of a wave of safety consciousness that is spreading over the entire nation. Companies, clubs, men and women's organizations, and the schools have definitely given Safety a place on their

programs, looking forward to the reduction of suffering caused by accidents in this country.

In drawing conclusions, I assume that your management is already sold on safety. You men who believe in the principles and benefits of safety should not allow your program to be separated from the operating policies of your company. Do not treat safety as something special.

When a boxer prepares for a battle he does road work, he skips the rope and shadow boxes, punches the bag, he develops his punch, he is primed for the fight but at 35, his legs give way, his under-pinning is gone. He has been a specialist, and in a short time he is through. Your safety program if treated as something special will surely follow the same route, for when the big effort is spent and the interest wanes, an inevitable slump will follow. When you glorify any program there is always an aftermath which is stale.

To a full-time safety man the record of accident prevention is his bread and butter. A record of gradual and continuing improvement will put more butter on one's bread than one flashy prize-winning year, because the succeeding years do not measure up to standard.

What we give tomorrow must be born of us. Should we develop intensely for a flashy year or is it best to show a gradual but continued improvement? As to bonus or penalty, which one is used is not as important as the following of a comprehensive safety plan. This should receive the same degree of consideration, forebearance, firmness and attention to detail as are applied to accounting, engineering or sales.

# Investigation of Accidents

By GEN. H. G. WINSOR
Puget Sound Power & Light Co.

ACCIDENT is defined as "an event that takes place without one's foresight or expectation." Therefore, when an accident occurs, we face a situation subject only to such general advance provisions as the following:

1. Well established general policies which are definite as to procedure and clearly understood by all employees.
2. A clearly defined line of authority and concurrent responsibility in accord with established general policy.
3. Reliable and experienced personnel, always available to meet emergencies.

With an established policy, clearly understood, we can then consider plans for the successful performance of the parties involved in securing desired information. Such planning should clearly demonstrate the procedure to be followed in securing:

1. Prompt and reliable methods of notification which will initiate immediate and effective action and give the investigator as clear and complete a mental picture of the scene and results as possible.
2. Immediate action to secure.
   (a) Reconstruction of the event in detail.
   (b) Sequence of events which preceded the accident.
   (c) Names and residences of principals and witnesses.
   (d) Information as to the extent of injury and damage to persons or property.
   (e) Photographs and map descriptions of scene when necessary.
   (f) Weather and geographic conditions which may have contributed to the cause.
   (g) Information concerning location of injured party or damaged property.

The picture of an accident in the mind of a witness, to be reliable and helpful, must be reproduced in the form of a written statement as soon following the occurrence as possible, as details fade from the mind day by day.

While the same rules and procedure should be followed in the initial investigation of all accidents, the determination of responsibility and the follow-up usually differ somewhat between accidents which involve our employees, on the one hand, and those which cause injury or damage to the public on the other.

Accidents to employees usually happen in the presence of or near fellow-employees. Proximate cause is not hard to determine. However, we cannot overlook the probability of contributing causes. A number of methods are used to arrive at a definite conclusion, the most common being review of evidence by a group of experienced employees engaged in similar capacity; conclusions arrived at by the investigating authority without consideration by others, and formal hearings by a group of qualified disinterested persons who follow up the preliminary investigation by an examination of witnesses, view the scene of accident, the equipment or plant installations involved, and make a formal report concerning causes and responsibility.

The latter is, I believe, the most effective.

Accidents which cause injury or damage to the public present a different problem. In our type of business such occurrences often necessitate technical analyses of cause. Sometimes other agencies are involved. In such cases, the closest cooperation should be maintained between the investigator and a competent and experienced lawyer.

Investigations where personal injury is involved require special consideration during the period of disability. Care of the injured should be intrusted whenever possible to trustworthy physicians. Contacts with the patient should be carefully planned. Avoid the appearance of unusual anxiety but exercise reasonable supervision. In the event previous injury is disclosed a complete record of its cause and extent is important. The possibility of excessive damage on account of personal injury in litigated claims indicates the necessity for carefully investigating all accident reports. So called blind cases, not reported until considerable time has elapsed, are especially troublesome. In such cases, under-cover investigation is justifiable if fraud is suspected.

Records of all investigations should be carefully preserved regardless of whether or not they result in immediate claims.

In accidents which result in property damage only, the problem of investigation is more clearly defined and simplified. But the damage to be allowed, if any, depends upon the same basic principles as in injury cases.

Prompt and reliable appraisals by competent disinterested parties should be made where the measure of damage warrants such action. Generally speaking, an ever-recurring consciousness of the other fellow's troubles, together with a true sense of justice will best serve all parties concerned in the solution of investigation problems.

Finally we must realize that no person can be successful in investigation work unless he can overcome the natural prejudices which always develop as a result of the deception, malingering, and dishonest statements which are encountered in his contacts with the many types of persons involved in accidents. He must at all times remain open minded regardless of the fact that on the one hand his employer depends on his judgment and fairness and on the other the injured party often demands a type of so-called justice which is far from being equitable.

If we could eliminate that selfishness which is inherent in the human family our problems of accident investigation would be greatly simplified and many automatically excluded. The picture at present is far from encouraging in this respect and we must carry on with the hope that some day a new philosophy of life will develop in which honesty, justice, and universal practice of the Golden Rule will prevail.

# The Electric Fence

By WILLIAM L. CONE
Utah Power & Light Co.

THE electric fence is a radical departure in electrical use. Heretofore we have exerted every effort so to insulate electrical conductors that it would be impossible for animals or persons to divert current through their bodies. But for years electrified wires have been used by those with little realization of the danger involved to keep off dogs, cattle, and even to guard against burglars. Many tragedies have resulted.

During the last few years an attempt has been made to use the effect of shocks to control animals and at the same time to protect both human and animal life. Whether or not a fence which depends for its effectiveness on a shock can be made entirely safe is problematical. The best authorities consider that it is not safe to administer an electric shock to a person except under supervision of a skilled physician. For this reason it is doubtful if an electric utility should give approval to any electric fence.

However, the fact remains that electric fences are in use by the thousands and their use is rapidly increasing. Their simplicity and low cost, together with the fact they will restrain animals which break through ordinary types of fences, make them popular with the farmer. A temporary fence may be thrown up in a hurry to permit pasturing a field after the crop has been harvested, and then easily moved to another location.

Having the electric fence with us and no way to stop its use, we have a responsibility to the public to do all we can to minimize the danger.

Electric fences may be divided roughly into three classes: (1) those manufactured by reliable companies which endeavor to manufacture a controller which will never permit electricity to be applied to a fence in a way which might cause injury or death; (2) those manufactured by unscrupulous and ignorant persons for sale to the farmer which give no protection whatever; (3) the one manufactured by the farmer himself or his high-school son. Neither he nor his son has the necessary knowledge to determine what device is safe.

Mechanically these devices can be subdivided again. Of those manufactured by reliable manufacturers some depend on an inductive discharge, some on a capacity discharge, and some on an intermittent a.c. output. Some of these are supplied by alternating current from the utility lines and some from batteries.

Those manufactured by the unscrupulous and ignorant manufacturer and the farm handy man generally consist of some form of resistance in series with the fence. Often this resistance is a lamp globe of from 7½ to 15-watt capacity. In some cases ignition coils are used together with mechanisms from old pendulum clocks to make and break the circuit.

Attempts at regulating the electric fence by state and local authorities are more or less recent. On December 10, 1936, the Bureau of Labor of the State of Oregon issued orders governing the use of electric fences in that state. These were the first of which I have any knowledge. I understand that Oregon is now revising its rules. (Possibly they are completed by now.)

The Industrial Commission of Wisconsin has issued "General Orders on Electric Fences" effective October 6, 1938. These are based on a great deal of study and are quite detailed in regard to the construction specifications, methods of testing, and use of the equipment. These rules limit the use of fences to those which will confine a possible body-current to safe limits.*

Other states are considering rules to govern the use of fences. A few states prohibit the use of a device which is not passed by the Board of Underwriters, which practically bans the use of any electric fence.

What action should utilities take? It is extremely doubtful if we should take a stand approving any electric fence; however, we are not in a position to stop their use. It is certainly a great deal better to use our influence to encourage the use of fences which will be at least relatively safe. So far as I know no serious results have occurred in the use of devices which pass the Wisconsin rules. Where there are as yet no local laws governing their use, we should discourage the use of any fence which does not pass the requirements of the State of Wisconsin. Probably due to the small amount of energy behind it, the safest electric fence is one which has a battery as its source of electricity.

* As given by L. P. Ferris, P. W. Spence, Dr. H. B. Williams and Dr. B. G. King in "Effect of Electric Shocks on the Heart," Electrical Engineering, May, 1936.

## Utilization Committee*—Illumination†

# School Lighting

## A Review of WPA's program

By LADNER V. ROSS
Washington Water Power Co.

IN 1926, there were no useful lightmeters, there was no Science of Seeing to furnish factual backing, there were no General Electric Lighting Sales Kits, and no G. E.-LaSalle Training Courses in Commercial Lighting Sales. There was little to choose from in the way of lighting equipment suitable for classrooms — what there was, cost so much more than equipment generally in use at that time that it made our story sound ridiculous.

Our first efforts were in connection with *new* school buildings. I recall the case of a grade school in Spokane. The best we could do was get four 300-watt indirect units accepted on demonstration in a room of 750 sq. ft. The ceiling was unfinished plaster. Everybody thought that was grand lighting in those days—but nobody offered to dig up the extra cash—so several months later the units came out, much to the disappointment of the teacher.

Later, two new junior high schools came along, and by working diligently with the architects, we succeeded in raising the standard for the school district from four 150-watt direct enclosing units about 9 ft. above the floor to four 200-watt units at proper mounting heights. While these two buildings were being designed, we had installed some pretty fair indirect lighting in the room where the Board met—the fixtures were later purchased for the district administration offices but not for the classrooms!

A few years later, in 1930, a new high school was built in Spokane. We had been making ourselves either use-

* Walter Brenton, Portland General Electric Co., chairman; O. D. Lanning, Eastern Oregon Light & Power Co., vice-chairman; and members of subcommittees on Illumination and Utilization Devices.

† F. H. Murphy, Portland General Electric Co., chairman; B. C. Electric Railway Co., R. Hall; Northwestern Electric Co., J. C. Plankinton; Pacific Power & Light Co., G. B. Bocarde; Puget Sound Power & Light Co., C. T. Bakeman; Utah Power & Light Co., J. C. Littlefield; The Washington Water Power Co., L. V. Ross.

ful or bothersome in so many ways to the school administration authorities by this time that they decided to let us work with them on the wiring lay-out and selection of lighting equipment.

To assist the School Board to recognize other features than price in the selection of lighting equipment, we prepared fixture rating charts along the lines of those used so successfully by Francis Murphy, of Portland. These charts supplied a means of evaluating the merits of lighting units according to the following characteristics: glare, light distribution, quantity of light output, shadows on working plane, maintenance, dust and dirt depreciation, appearance and cost.

I was appointed a member of the board's sub-committee on lighting equipment, and I can assure you that it was a conscientious job of rating which we turned out. It was particularly gratifying to note in the final compilation that indirect fixtures had the highest ratings. Semi-indirect units were in the middle, and the direct lighting fixtures were at the bottom. Fifty of the 200 fixtures purchased were totally indirect, and this marked the first real step forward in the lighting of Spokane's schools. The arguments that prevented the entire job going indirect were rather interesting. One was that classes adjourned so early in the afternoon that there was little need for good artificial illumination. The other was. that if indirect units were used, it would preclude the possibility of later reducing lamp sizes if found economically necessary.

In other words, they had been convinced of the value of this better type of lighting but were not willing to pay the price. In connection with this job, we equipped a classroom with the particular lighting fixtures that scored highest in the rating so that all the board members could see for themselves. We had intended discussing foot-candle levels, but when we found that the three "Grease Spot" type of light meters in town all showed radical differences in readings, we decided the less said on that point the better. I mention some of these details merely because they indicate the difficulties we had in selling better lighting.

In 1934 we increased our commercial lighting sales force from one to ten and continued our school lighting activities on a much broader scale. By this time, we had photo-cell type light meters, the Science of Seeing and the General Electric lighting kits as invaluable aids to our efforts.

As many of you may know, during the first week in April of each year, there is held in Spokane the Inland Empire Education Assn. Conference, which draws in between 3,500 and 4,000 school teachers from all over the Northwest. We have felt that any activity to gain their appreciation for good lighting would be worthwhile and accordingly, for three years, we have gone to considerable pains to set up an exhibit. In 1935 we copied a better vision display used by the Utah Power & Light Co. and had it placed on the mezzanine of the Davenport Hotel close to the Conference registration desks. Home Service Advisers copied names and addresses of registering teachers and handsome invitations were promptly mailed out. This display created wide favorable comment and while we do not know of an actual school job resulting therefrom, at least it sold the Davenport Hotel on a complete relighting program and several other commercial installations were a direct result.

The following year a photo-cell-controlled installation was set up in a classroom at the high school where most of the activities of the conference centered. This was publicized by attractive bookmarks distributed to the delegates, and it again aroused considerable interest.

In 1937 we used the front hallway of this same high school for a practical demonstration, installing some seven or eight of the better known lighting fixtures suitable for classroom use. Each fixture had a tag showing the catalog number, trade description and the name of the jobber who carried it. This hallway is used each year as an exhibit space for manufacturers of school equipment and is a focal point throughout the conference. An attractively lighted sign opposite the main entrance called attention to the display of fixtures.

In all three of these displays we had members of our lighting sales staff present during all daytime hours, prepared to answer questions and hand out appropriate literature which we obtained from the General Electric, Westinghouse, and Better Vision Institute.

About this time, we prevailed upon one of the manufacturers of lighting equipment to supply two fixtures suitable for modern lighting of the office of the school superintendent, and these were installed in connection with the presentation of the story contained in the simple demonstrations of the General Electric commercial lighting kit. We feel sure that this was an important step in our promotional activity although there was a tendency to be non committal because of the economic angles involved.

By this time in our story we had found it highly desirable to offer architects a complete engineering service on the electrical lay-out for schools, inasmuch as they were not inclined to hire this service and actual lay-outs were inconsistent with modern lighting practices. Accordingly in 1937, when one of the grade schools in Spokane had to be rebuilt after fire damage, we found the architect and school administration glad to accept our electrical plans and specifications. In order to get a start of real lighting, we offered the school board an installation of photo-cell control, provided they installed lighting equipment which we could approve and lamp sizes as marked on the electrical plans submitted. These conditions were accepted, and the job is now installed just as we planned it. It is interesting that a PWA inspector who was looking over a project for improvements in the Spokane schools gave a long interview which was published in the newspapers in which he stated that this particular school was the only one that had satisfactory lighting among the 54 buildings in the Spokane district.

Last year when considerable repainting of schools was taking place under WPA auspices, we found it possible for the first time, after years of effort, to persuade the school officials to consider lighter colors for the classrooms. In one school where a painting program was under way, we selected one typical classroom, had the fixtures washed and new lamb bulbs installed and made nine readings at the working level as well as measuring the reflection factor of ceiling and sidewalls. We instructed the janitor to take these new lamp bulbs out of the fixtures and mark them. The following week, after the room had been redecorated in accordance with our recommendations, we again washed the fixtures and installed the same lamp bulbs as for the previous test and took nine readings in the same locations as well as measuring the reflection factors of ceiling and sidewalls.

This simple test showed the school board that they could obtain almost 25% additional illumination with exactly the same lighting equipment and in addition a much more cheerful atmosphere by choosing tints that have a good psychological reaction. A model school room, that we have built, will to a considerable extent, demonstrate this test in miniature as the "before" and "after" colors are identical to the actual room described. For the purposes of this model demonstration,

it was found necessary to use indirect lighting as the distance from the light source to the light meter would not give a comparative result otherwise.

The paint demonstration was probably the most significant activity of all we have undertaken because it convinced the school officials that we were sincerely interested in improving seeing conditions, even though it meant no additional revenue to us.

Other activities which have had an important bearing on the almost universal acceptance of modern lighting standards for schools throughout our territory include the wide-spread use of sound slide films prepared by the Incandescent Lamp Department of General Electric, the National Better Light Better-Sight Bureau, and the Better Vision Institute. We have purchased approximately 50 of these films and records to date, some of them being duplicates, and we have a projector in each division throughout the system. In the winter of 1934-1935, I showed the film entitled "Science of Seeing" to over 5,000 students, teachers and parent-teacher organizations in different parts of our system. Even where the most vigorous censorship for anything having a faint odor of commercialism existed, we were given full approval for the use of these films. Both commercial salesmen and home service advisers are making consistent use of these sales aids. School programs presented between October 1, 1938 and February 28, 1939 total 223 meetings having an attendance of 18,723 students.

Sight saving charts depicting the history, geography, general science, and health facts of lighting have been widely used in grade and high schools throughout our territory. These are prepared in colors by the General Electric on linen backs and are large enough for all to see when hung on the wall. Some 175 sets of these charts were purchased by our company and distributed to interested teachers who used them as a regular part of the curriculum.

**Summary**

In practically every new PWA school or addition on our system, the wiring is adequate for the use of 4 watts per sq. ft. in the classrooms. This would be equivalent to six 500-watt lighting fixtures in an average classroom of 22x34 or 750 sq.ft. While in some cases this amount of lighting has not been installed, whatever has been used is a long step forward. The standard created by these new schools has made such a significant contrast with the lighting used in the schools in the same territories that we have almost weekly requests for re-wiring and re-lighting plans for these older schools. A significant angle that has played into our hands in the last few years has been the vigorous enforcement of the National Electric Code by State inspectors. The wiring capacity for school occupancies compulsory under the code are ample to provide 20 ft.-candles of indirect lighting in the classrooms, and since in any new building or re-wiring of an old building these capacities must be provided, it has naturally been very much easier to get the actual equipment installed. In the last five years we have prepared electrical plans and specifications for approximately 100 new or old schools on our system.

In Spokane last year, PWA projects were prepared for improvements to existing schools, covering modernization of heating systems, sanitary systems and lighting and wiring systems throughout all the schools in the district. Much publicity was given to these projects in the various school papers, the city newspapers and in PTA meetings. The PWA inspector sent over from Seattle to investigate the soundness of these projects discussed at length the deplorable condition of the lighting in the Spokane schools and indicated that the correction of this condition was the most needed improvement. The bond election carried by a majority of approximately 4.5:1 so we have in prospect the raising of Spokane's school lighting from four 150-watt direct enclosing units to six 500-watt indirect lighting units per average classroom. This will be carried out as soon as we have another release of PWA funds. Several of the re-wiring lay-outs have already been completed.

So, I believe you will agree that while it has been a long, difficult job, the final results we are now realizing justify the efforts and disappointments along the way.

# 50-Foot-Candle Installations

By C. T. BAKEMAN
Puget Sound Power & Light Co.

AS I analyze this subject, it seems to me there are really three problems connected with these 50-ft. candle and and higher installations: the need, the selling, the engineering. My discussion is confined primarily to the need and engineering problems.

The need problem is basic to every engineering solution, as well as to every successful sale. In this case, our first problem is: How much light do we need? Do we need 1 ft.-candle or 10,000? Both these levels are within our experience, yet if we are going to engineer lighting on a rational basis, we must have some rational standard of selection.

I have heard of many answers to this question of how much light we need. Many of these are based on mere personal opinion without fact or research to support them. I have read and heard the blunt general statement that 10 ft.-candles is enough. My answer to this statement is another question, "Is enough for what?" The complete question should be "how much light is enough for *what*?"

This question "for what" covers a large field. It can be broken down into two questions: For what visual task? For what seeing result?

The visual task itself may vary both as to the severity of effort and as to extent of time. Taking the severity of the visual task, first let us use a simple standard such as reading a well-printed book, using black print on matt white paper. Few will say that 10 ft.-candles is too much for casual reading of a well-printed book. If we agree that we need 10 ft.-candles for easy reading of this book, then research has shown that we need 30 ft.-candles for the same easy reading of the average newspaper. We will need 50 ft.-candles for the same easy reading of a telephone book. We would require 100 ft.-candles for the same ease of distinguishing the 1/64 division on a steel rule. We would need 400 ft.-candles for the same ease of seeing black thread on black fabric.

The research referred to is that of Luckiesh and Moss on prescribed light and lighting. This research has given lighting engineers the visibility meter, with which they can analyze almost any visual task, determine its relative visibility and prescribe light and lighting to fit that task. It represents a great step in the direction of rational standards.

The time exposure or extent of visual work is almost as important as the severity of the task itself. Almost every one has experienced the sense of drowsiness or fatigue resulting from reading the evening paper cover to cover even under the best of better-sight lamps. Contrast this with the easy hunting from headline to headline of short duration. A proof reader rapidly, carefully and continuously reading difficult type has a much more severe visual task than the casual headline hunter. Much more light is needed to bring this same visual task down to the same ease of seeing. There is

much research to prove this point and actually to measure the reduced visual efficiency (visual acuity) from extended difficult reading.*

So far we have considered only the visual task and the element of time exposure of this work. We have given no thought to the seeing result we hope to get nor economics of obtaining this result. This is an essential engineering consideration. For instance we could engineer a roadway to provide safe comfortable travel for 20, 30, 40 or 50 mi. per hr. between two cities. This would be engineering for various speed levels or transportation results. For a given pair of eyes and a given seeing task, we have a wide range of seeing results possible.

These seeing results can be expressed in terms of different seeing levels. They vary all the way from complete invisibility up to maximum ease for seeing. For instance, take a white sheet of paper with 8-point black Bodoni book type and place this in a totally dark room. As we gradually introduce light into this room we increase our ability to see.

First we think we can see the paper, then we are sure we can, then we think we can see the printing, then we are sure, then we think we can distinguish the letters, then we are sure of each letter and word, then we can read along slowly, then fast. Finally we have obtained the maximum ease of maximum-speed reading.

If we had a recording foot-candle meter in this room it would have started out at a small fraction of a foot-candle. We would be amazed to see it read over 100 ft.-candles for the maximum ease of seeing. And this is the task that we assumed needed only 10. Enough light for what seeing result?

Costs must enter into every engineering problem and it is a prominent factor in lighting engineering. Considering lighting as an aid to seeing, we must balance the costs of added lighting against the costs of seeing under less favorable seeing conditions.

Under lighting costs we have: amortization of the investment, cost of lamp replacement, cost of power.

Under costs of seeing we have: cost of uncertainty of seeing-errors—accidents; cost of slow seeing—time lost, delay, wasted man-hours; cost of difficult seeing—eyestrain, health impairment, fatigue, impaired sight.

The costs of errors and time wasted are measurable. Many business men have proved that these costs far outweigh the costs of 50 ft.-candles or more. Over and above these costs of errors and time when we are providing greater ease of seeing, we are saving human costs, we are dealing with human welfare, difficult to measure in terms of dollars and cents.

With these new conceptions of lighting and seeing brought to us by sound and substantial research, we have a rational answer to this problem of how much light.

Our next problem is engineering this level of lighting for maximum seeing results and maximum efficiency. In analyzing our visual tasks, we have determined where each is performed, the frequency and duration of this work. Assume we have an executive office. The general area of the office is used for conference and occasional visual tasks for which 20 ft.-candles of indirect lighting is easily justified. On the desk and in the desk sitting position we find a specialized visual center requiring occasional extended work of difficult nature justifying 100 ft.-candles.

A practical solution would be to provide 20 ft.-candles of indirect lighting throughout the office, building up to 30 ft.-candles on the desk area. To this we would add 70 ft.-candles of louvred lighting so directed as to eliminate the possibility of direct or reflected glare. This should provide a comfortable condition since experience shows that a ratio of brightness of 5 to 1 can be used without sharp or uncomfortable contrast. We would avoid mirror surfaces and sharp changes in dark and light surfaces to avoid exceeding this ratio in the normal visual field.

Contrasted with this we may have a statistical department where the entire area is devoted to fine printed or carbon reports on colored papers. Visibility meter tests on this work may indicate the need of 50 to 100 ft.-candles on this entire area. This brings us into a very definite comfort engineering problem. Control of glare, heat, shadows, and other discomfort problems must be met.

Glare may be termed brightness or brightness contrast that has become uncomfortable or a handicap to seeing. Indirect lighting has proven the most comfortable for usual levels of lighting because it reduces the brightness contrasts with a near uniform ceiling brightness. It further reduces the glare effect by removing and reducing as far as possible the source of brightness. This type of lighting has proven most satisfactory in usual rooms for levels of lighting up to 30, 40 and possibly 50 ft.-candles. As we proceed to higher levels, an expanse of bright ceiling in itself may become a source of discomfort. This is further aggravated in low ceiling rooms. It is relieved in higher ceiling rooms, where the brightness is farther away and more out of the field of vision. It is aggravated by the large rooms with a wide area of ceiling brightness in the field of vision.

In our 100-ft.-candle rooms these problems may be met in different ways. False ceiling patterns may be developed to intercept the wide ceiling brightness from normal vision. Ceiling coffers or wells may be built in to hide from normal view the lighted ceiling area at the same time providing diffused shadow-free downward lighting. Republic Steel Co. has developed a special ceiling surface with angle reflections that reduce the apparent brightness and increase the efficiency of this indirect lighting. A combinations of 50% indirect lighting and 50% louvred down lighting may be developed that would minimize sharp shadows. Fluorescent lighting may be used with proper glare control to minimize the heat problem.

Even with all these devices, certain rooms are going to be found suitable to high level general lighting. A low ceiling large room with high human occupancy may involve serious heat and glare probems. It is just as impractical to overcrowd brightness and lumens into a confined interior as it is to overcrowd human beings into too close an interior.

* Ferrie Rand Charts.

# Light Projection On Curved Walls

By THERON W. FITCH and
E. R. FLETCHER
Portland General Electric Co.

IN THE rotunda of the new State Capitol Building at Salem, Oregon, are four large mural paintings, depicting four moments of historical importance in Oregon's history. These murals are on curved wall surfaces in each is 10 ft. high and 25 or 30 ft. in length. The equipment provided to light these murals independently of the general lighting consists of two 1,000-watt projectors for each mural, the projectors being mounted above the ceiling, 33 ft. above the murals and 16 ft. away horizontally. Each projector lights half the mural, the beams crossing.

The projectors are of double condensing lens type, equipped with 1,000-watt, medium bi-post lamps, (clear projector type), with a black, sheet-iron mask frame fitting into a slot of the projector housing, and designed to hold in a spring clamp small short strips of black sheet-iron adjusted and ar-

ranged to form the outline of an opening to control the shape of the light beam. It was intended that these strips be arranged through trial and error to restrict the light to the murals themselves, with no light projecting onto the surrounding wall areas. The adjustment of these projectors and masks was to be left to the electrician.

Attempts had been made to form such a shaped opening with the straight metal strips previous to the time our services were requested by the architect. The State Legislature was to convene in one week, and the mural artists had refused to OK the lighting results. Irregular tongues of light appeared above and below the murals, and the effect in general was very discouraging. So what to do?

It was realized immediately that any attempt to control light projected at an angle onto a curved surface with straight edge strips, was doomed to failure. Curved lines of the opening were necessary to compensate for the curve of the wall, and a curved line obtained by piling straight short lengths would result in too much thickness. The heat of the beam buckled and scaled the metal so that it was most difficult to handle and to adjust. It was decided therefore that the best plan was to describe the correct beam shape as an aperture in a metal mask, and place this mask in the spring frame for insertion in the slot of the projector. How to determine this correct shape was the next question, and the decision was made to take a picture of the mural through the ceiling projector aperture on the same line as the projector beam, then to cut a hole in the metal plate the same shape that the mural appeared on the picture.

This was done and when the picture had been developed and printed, the mural was cut out and the outline scratched on the mask with a scratch awl. The area inside the scratch was cut out, and the mask was ready. The required height of the opening had been determined from one of the patterns constructed in previous attempts with the straight strips, so this experimental mask opening was reduced in proportional dimensions. The final mask apertures were determined by means of photographic enlargement apparatus to obtain exactly the same shape that the mural appeared on the negative, adjusted to the experimentally determined height.

A complication of the situation was the fact that the murals to be lighted were not visible to the one who was adjusting the projector. To view the results one had to be on the floor of the rotunda, 50 ft. below, and 50 ft. away horizontally. Conversation was impossible. To overcome this difficulty, a temporary telephone system was set up.

It was thought that a white metal would reflect the heat away from the mask and thus reduce the buckling and scaling, and actual burning of the edges which destroyed the aperture outline. The original experimental outline mask was made of 18-gage aluminum, which was the only white material available at the moment, and this material proved very satisfactor. It was easy to cut and dissipated the heat rapidly.

It had also been found that the adjustment equipment provided with the projectors would not permit the light beam to center on the murals, the lowest possible adjustment being 15 to 20 ft. above the mural center. Brackets supported the projector housing and would not allow sufficient forward movement.

The findings and results of the experiments satisfied all concerned that we had the answer, so orders were given to make the new masks and to change the brackets. Some masks were made from stainless steel to see if that metal would be satisfactory. It was found however, that warping persisted so a full set of eight masks was made from 18-gage aluminum. An additional refinement incorporated in the aluminum masks, consisted of a handle extension of the mask material as a convenient means for adjustment. One aluminum mask, after 1,000 hr. use showed no distortion or discoloring. One stainless steel mask showed considerable discoloration but no scaling. There was a slight warping in the center, however.

The results were entirely satisfactory to the mural artists artistically; to the architects professionally; the illuminating engineers objectively, and we are constrained to hope, to the general public subjectively.

# Utilization Committee—Devices*

## Load Tests on Water Heaters

By G. M. PALO
And C. S. ALGER

PACIFIC Northwest companies have load curves in which there is a predominant evening peak of relatively short duration which always occurs at approximately the same time and is caused essentially by the electrical cooking load. For this reason only one type of control using a 20-hour charging period will be considered. The same line of approach discussed herein can, however, be used for all systems in order to solve their own particular problem. The capacity that must be provided to carry the peak loads is idle a large majority of the time and since that water-heater load can be carried by this otherwise idle capacity the cost of water heating service can be reduced so that suitable competitive rates can be established without imposing a burden on other consumers.

Extensive tests have been made during the past ten years to determine the characteristics of the water heating load. It is therefore of exceptional interest to examine and compare additional data from resent tests in Salem and Portland with the results of previous studies. Salem tests were conducted by Portland General Electric Co. and those made in Portland were conducted jointly by the Portland General Electric and Northern Electric Co. In each case the tests included single-element, 3-kw., 30-gal. heaters and two-element, 2.65-kw., 40-gal. heaters, operated both controlled and uncontrolled.

Salem tests were on two groups of full-use customers, each customer having a range and water heater. Each group was connected to a single transformer provided with metering equipment to determine the characteristics of the load. The first group contained 15 customers having single-element 3-kw. water heaters and the second, ten customers having two-element, 2.65-kw. heaters. Each group was given four one-week tests, as follows:

1. With water heaters operated uncontrolled;
2. Using time switch control with 4-hr. off period;
3. Using time switch control with a 2½-hr. off period;
4. With peak-limiter control.

* E. E. Walker, B. C. Electric Railway Co., chairman; The California Oregon Power Co., R. S. Daniels; Eastern Oregon Light & Power Co., O. D. Lanning; Grays Harbor Railway & Light Co., H. G. Kelsey; Idaho Power Co., O. C. Mayer; Northwestern Electric Co., Corbett McLean; Pacific Power & Light Co., J. E. Yates; Portland General Electric Co., A. H. Greisser; Puget Sound Power & Light Co., G. M. Palo; Utah Power & Light Co., A. C. Kelm; The Washington Water Power Co., H. C. Bender; West Coast Power Co., Henry Berk.

During these tests both total water heater load and total group load were separately recorded for each group. Results of the tests using time switch control with the 4-hr. off period on one hand and with the heaters operating uncontrolled on the other hand are used in the discussion to follow.

Tests at Salem using peak limiters which are automatic devices designed to turn the water heaters off when the range load reaches a certain value and vice versa, indicated that there was very little, if any, reduction in either the water heater demand or the total group demand when it was used. For this reason peak limiters were not included in the Portland tests. In this connection it is of interest to note that in 1925 the N.E.L.A. conducted a series of tests in the Northwest and in other parts of the country in which a double-throw switch was inserted between the range and the water heater in a manner to prevent any operation of either device at the same time, and even under these conditions they found that there was very little reduction in either the water heater demand or the total demand of the feeder.

The tests in Portland were made on Pepco's Hollyrood feeder, which had 1,408 customers, with 915 ranges, 193 controlled water heaters and 132 flat-rate water heaters. A series of tests on 59 of the 193 customers having controlled water heaters was made using two-element and single-element water heaters operated both controlled and uncontrolled, but the presence of furnace coils in 20% of the heaters in this group resulted in lower group demands that would obtain with all-electric operation. Tests were repeated for 44 of the 193 customers, using installations with no furnace coils. Two runs of these 44 two-element heaters were made operating them one week controlled and another week uncontrolled. The results of these tests are used in the discussion to follow. This was not done for the single-element heaters; consequently the only data available on all electric operation of these heaters are from the Salem tests.

Fig. I shows the diversified demand of high-wattage, single-element heaters and two-element heaters operating in both cases uncontrolled. The curve for the single-element, 3-kw. heater was obtained from the maximum day of a one-week test on 15 customers in Salem. The demand on this day at the time of the system which occurs between 5 and 6 p.m., was 510 watts as compared to an average for the period of the test of approximately 600 watts. It should also be noted that this is the lowest point on the body of the curve and any slight change in the time of water use will result in an increased demand.

The curve for the two-element 2.65-kw. heater was obtained from the weighted average of the maximum day of a one-week test on 44 customers in Portland and of ten customers in Salem. The kwh. consumption of the two-element heaters in the Salem tests was considerably lower than that shown by the 3-kw. heaters and in order to obtain a day's curve in which the kwh. were approximately the same. This was done by averaging with the Salem two-element heater test, the test on the 44 customers at Portland in which the kwh. consumption was higher.

The third curve on Fig. I was obtained from N.E.L.A. publication No. 166, covering tests made on fourteen single-element 3.58-kw., 30-gal. heaters in Seattle during 1929 that were similar in all respects to those used in Salem except that they could be manually controlled. These curves show:

1. That the 3-kw. single-element heaters have a high morning peak at the time of maximum water use and a secondary early evening peak;
2. That their load factor is low, having a high peak demand and very little night operation;
3. That the operation of the two-element heater, because of its design, results in a maximum peak only 60% that of the single-element heater;
4. That the two-element heater has a much higher load factor with considerably more night operation and a more uniform distribution of energy use throughout the day.

It should be noted that the curve for the single-element high-wattage heater, as obtained in Salem, is almost identical in all respects with that obtained in Seattle in 1929. Small differences that do exist can probably be credited to the slightly higher wattage and partial manual control. These points indicate that such improvements as have been made in the construction of these heaters in late years, have not changed their operating characteristics which have been well-known for many years.

There are also reported in the N.E.L.A. bulletin for 1931 tests conducted on two-element uncontrolled heaters in Florida and Illinois which confirm the peak demands and character of load shown here for the two-element heater.

In Figure II are shown the diversified load curves of single element 3-kw. heaters and two-element, 2.65-kw. heaters when subjected to control with the heaters de-energized from 4 to 8 p.m. by time switches. From these curves it is evident:

1. That the characteristics of the two heaters during the morning hours remain unchanged;
2. That the evening peaks of both heaters, after the control period, are greater than with uncontrolled operation.
3. That the peak of the single-element heater is nearly twice as great after the control period as that of the two-element heater, which has been designed for control. This characteristic of the single-element heater obviously makes it unsuitable for the type of controlled operation used in the Northwest.
4. That the morning peak of the single-element heater, is 128% as great as the evening peak of the two-element heater.
5. That considerably more night operation results for both heaters, thus to some extent relieving the daylight hours of water heater load and improving the system load factor.

The curve for the two-element heater operating controlled, as found in Salem, is representative of the performance given by this type of heater. Peak values, consumption and the distribution of energy throughout the day confirm, in all respects, the results of the many previous tests.

The Oregon tests show conclusively that the characteristics of water heaters are now so well understood that further field tests are hardly necessary. Any desired analysis of water heater performance can readily be obtained through calculations. This is well shown in studies made by the late C. P. Randolf of the Edison G. E. Appliance Co., in which he developed methods of calculation that accurately predicted the results of subsequent tests.

The curves in Figs. I and II, with the exception of the 1929 Seattle curve, form the bases for all further discussion of these heaters which will hereafter be referred to merely as single-element and two-element heaters. It should be noted that the demand data shown in these curves and in those that follow are on an hourly basis and therefore are more significant than data predicated on shorter intervals.

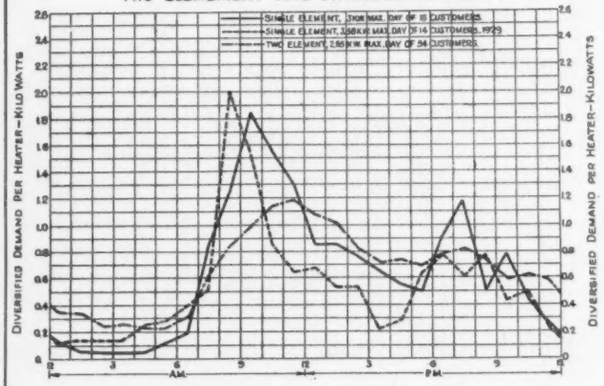
A comparison of the water heater and range curves is of interest because these two appliances are the two outstanding domestic loads. This comparison is made in three steps:

1. With the water heater and range loads alone;
2. With the water heater load or the range load added to a system load without ranges; and
3. With the addition of controlled and uncontrolled water heaters to a system load having a high saturation of ranges.

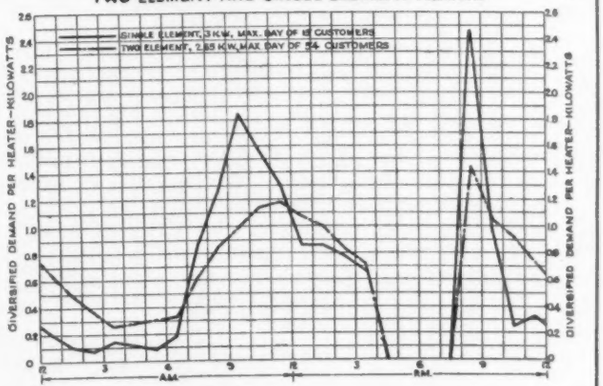
Fig. III shows a maximum range, appliance, and lighting load curve of the 15-customer group in Salem with a typical appliance and lighting load curve.* The difference of these two curves is the Salem range curve which in Fig. IV is compared with the single-element water heater operated uncontrolled. Curves in Fig. IV show:

* The typical appliance and lighting load curve used in Figure III was obtained from data compiled by the Tennessee Power and Light Company which have been verified by field surveys conducted by the Ohio Edison Company, Consumers Power Company and a sub-committee of the Edison Electric Institute.

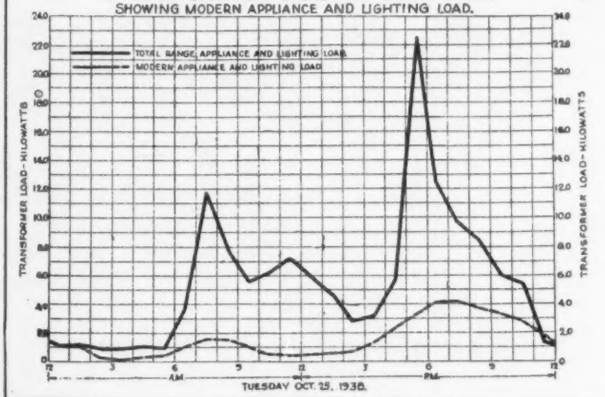
COMPARISON OF UNCONTROLLED
TWO ELEMEMENT AND SINGLE ELEMENT HEATERS


SINGLE ELEMENT, 3 KW MAX. DAY OF 15 CUSTOMERS
SINGLE ELEMENT, 3.68 KW MAX. DAY OF 16 CUSTOMERS, 1929
TWO ELEMENT, 2.65 KW MAX. DAY OF 54 CUSTOMERS
DIVERSIFIED DEMAND PER HEATER—KILOWATTS
AM.
PM.

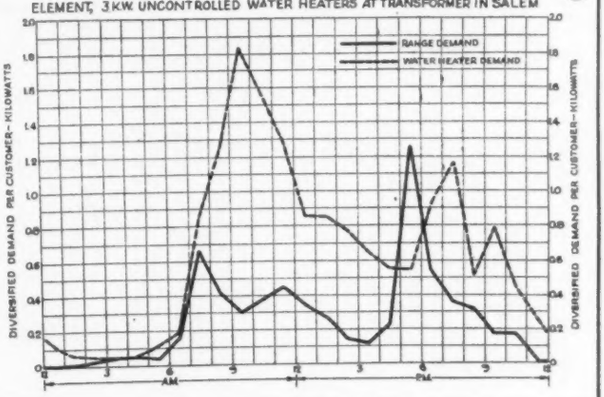
COMPARISON OF CONTROLLED
TWO ELEMENT AND SINGLE ELEMENT HEATERS


SINGLE ELEMENT, 3 K.W. MAX. DAY OF 15 CUSTOMERS
TWO ELEMENT, 2.65 K.W. MAX. DAY OF 54 CUSTOMERS
DIVERSIFIED DEMAND PER HEATER—KILOWATTS
AM.
PM.

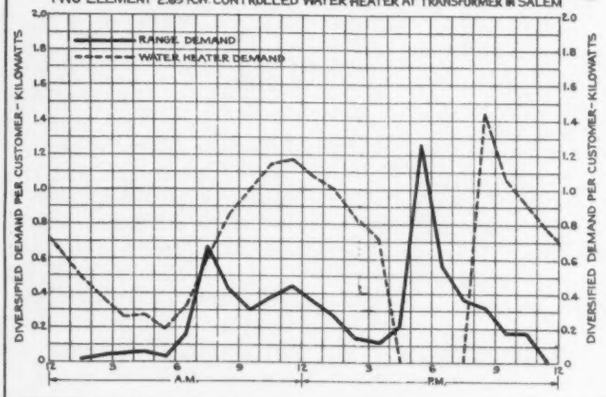
MAXIMUM RANGE, APPLIANCE AND LIGHTING LOAD
15-FULL USE CUSTOMERS ON ONE TRANSFORMER IN SALEM
SHOWING MODERN APPLIANCE AND LIGHTING LOAD.



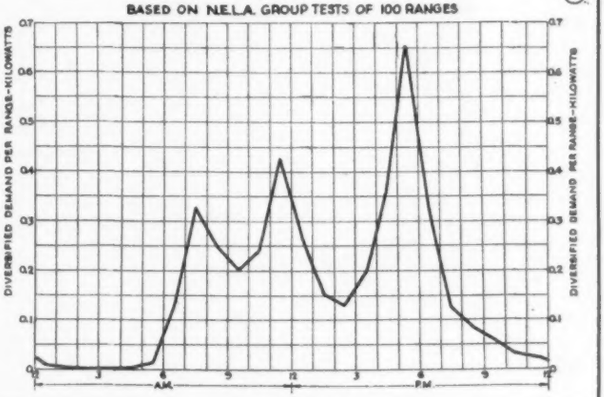

COMPARISON OF DIVERSIFIED MAXIMUM DAY DEMANDS OF RANGE AND SINGLE ELEMENT, 3 KW. UNCONTROLLED WATER HEATERS AT TRANSFORMER IN SALEM



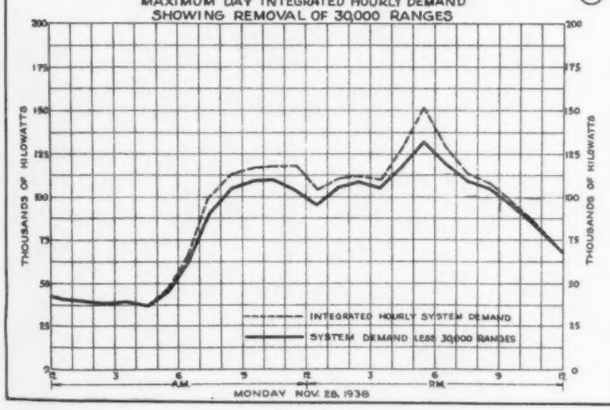

COMPARISON OF DIVERSIFIED MAXIMUM DAY DEMANDS OF RANGE & TWO ELEMENT 2.65 K.W. CONTROLLED WATER HEATER AT TRANSFORMER IN SALEM



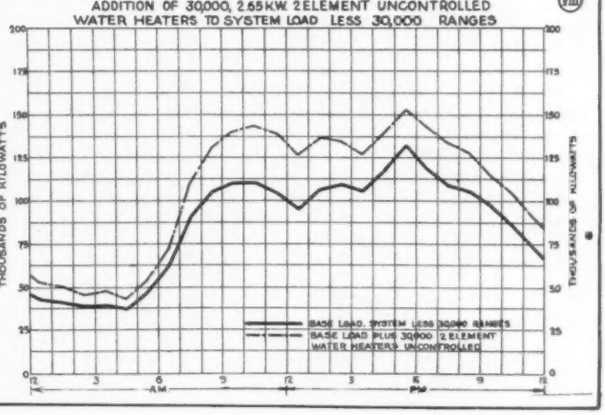

INTEGRATED HOURLY DEMAND FOR 500 RANGES
BASED ON N.E.L.A. GROUP TESTS OF 100 RANGES

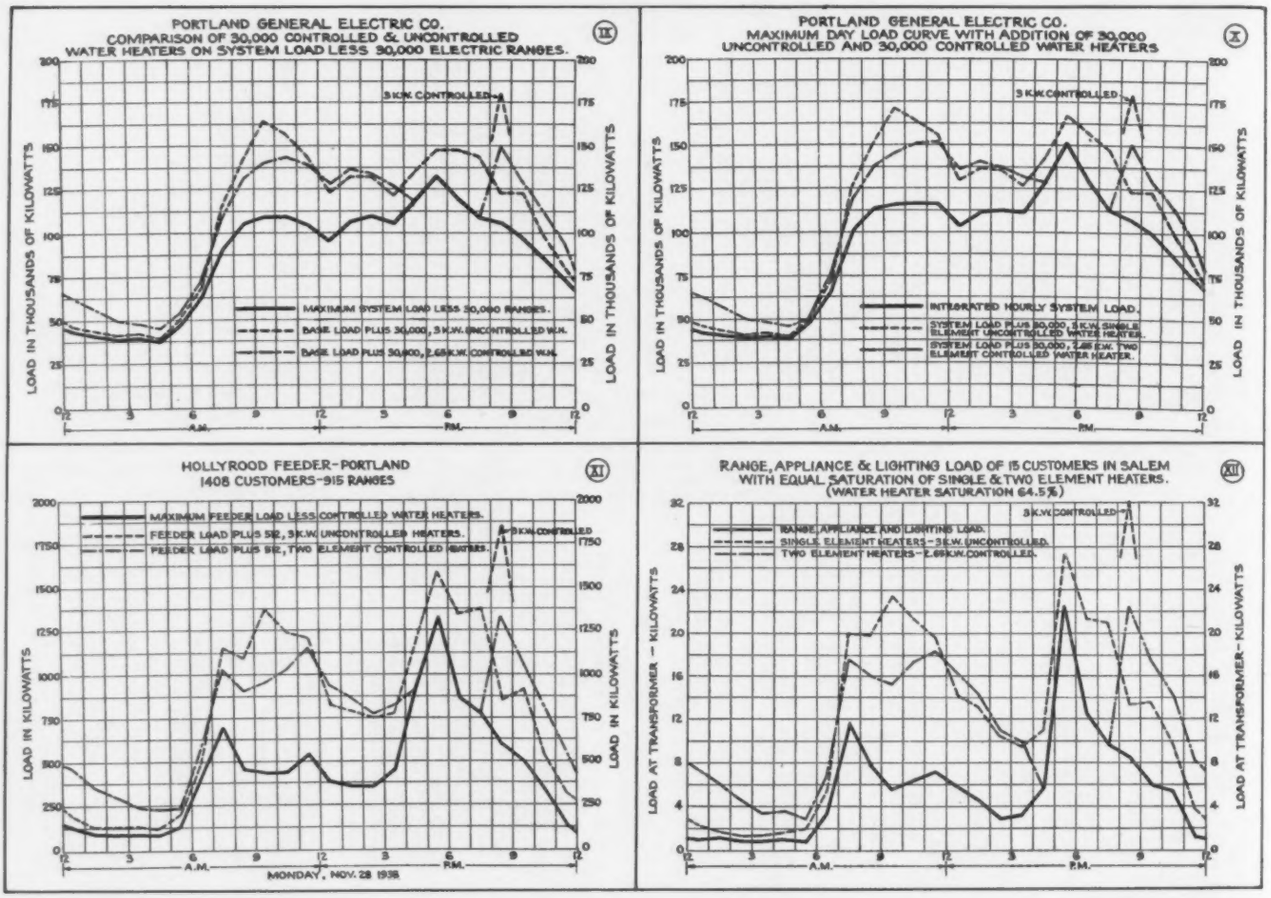



PORTLAND GENERAL ELECTRIC COMPANY SYSTEM
MAXIMUM DAY INTEGRATED HOURLY DEMAND
SHOWING REMOVAL OF 30,000 RANGES




PORTLAND GENERAL ELECTRIC COMPANY SYSTEM
ADDITION OF 30,000, 2.65 KW. 2 ELEMENT UNCONTROLLED
WATER HEATERS TO SYSTEM LOAD LESS 30,000 RANGES


BASE LOAD, SYSTEM LESS 30,000 RANGES
BASE LOAD PLUS 30,000 2 ELEMENT WATER HEATERS UNCONTROLLED
THOUSANDS OF KILOWATTS
AM.
PM


PORTLAND GENERAL ELECTRIC CO.
COMPARISON OF 30,000 CONTROLLED & UNCONTROLLED WATER HEATERS ON SYSTEM LOAD LESS 30,000 ELECTRIC RANGES.
IX
LOAD IN THOUSANDS OF KILOWATTS
3 K.W. CONTROLLED
MAXIMUM SYSTEM LOAD LESS 30,000 RANGES.
BASE LOAD PLUS 30,000, 3 K.W. UNCONTROLLED W.H.
BASE LOAD PLUS 30,000, 2.68 K.W. CONTROLLED W.H.
A.M.
P.M.
PORTLAND GENERAL ELECTRIC CO.
MAXIMUM DAY LOAD CURVE WITH ADDITION OF 30,000 UNCONTROLLED AND 30,000 CONTROLLED WATER HEATERS
X
INTEGRATED HOURLY SYSTEM LOAD.
SYSTEM LOAD PLUS 30,000, 3 K.W. SINGLE ELEMENT UNCONTROLLED WATER HEATER.
SYSTEM LOAD PLUS 30,000, 2.68 K.W. TWO ELEMENT CONTROLLED WATER HEATER.
HOLLYROOD FEEDER-PORTLAND
1408 CUSTOMERS-915 RANGES
XI
LOAD IN KILOWATTS
MAXIMUM FEEDER LOAD LESS CONTROLLED WATER HEATERS.
FEEDER LOAD PLUS 512, 3 K.W. UNCONTROLLED HEATERS.
FEEDER LOAD PLUS 512, TWO ELEMENT CONTROLLED HEATERS.
3 K.W. CONTROLLED
MONDAY, NOV. 28 1938
RANGE, APPLIANCE & LIGHTING LOAD OF 15 CUSTOMERS IN SALEM WITH EQUAL SATURATION OF SINGLE & TWO ELEMENT HEATERS.
(WATER HEATER SATURATION 64.5%)
XII
LOAD AT TRANSFORMER — KILOWATTS
RANGE, APPLIANCE AND LIGHTING LOAD.
SINGLE ELEMENT HEATERS — 3 K.W. UNCONTROLLED.
TWO ELEMENT HEATERS — 2.68 K.W. CONTROLLED.
3 K.W. CONTROLLED

1. That the morning peak of the single-element heater is three times that of the morning peak of the range.
2. That the evening peaks of the two are about the same.
3. That the maximum peak (morning) of the single-element water heater is approximately 150% of the maximum peak (evening) of the range.
4. That the use of energy for both the range and the single-element water heater is nearly all confined to the hours from 6:00 to 12:00 midnight.
5. That the daily kwh. consumption of the single-element heater is approximately four times that of the range.

Similarly, in Fig. V, the diversified load curve of the controlled two-element heater is compared with the same diversified range load curve used in Fig. IV, and as compared to the single-element heater the following points are evident:

1. That the morning peak of the two-element controlled heater is somewhat less than twice the morning peak of the range.
2. That the evening peak of the two-element controlled heater is slightly higher than the evening peak of the range.
3. That the maximum peak (evening) of the two-element heater is just a trifle larger than the maximum peak (evening) of the range.
4. That there is a considerable improvement in the distribution of energy use, there being an appreciable increase in the amount used in the early morning hours.
5. That the kwh. used by the two-element water heater are, as with the single-element heater, about four times those used by the range.

This first comparison, in which the two appliances, the range and the water heater stand alone, no other loads being considered, indicates that the water heater under any form of rate, should bring in more revenue than the range because it has a higher peak demand and because it consumes four times as many kilowatt hours and therefore costs more to serve.

To make the second comparison, namely the addition of the range or water heater loads to a system load without ranges, a maximum system load curve of the Portland General Electric Co., which occured on November 28, 1938, was stripped of 30,000 ranges on the basis of Fig. VI†, to obtain the base load curve shown in Fig.VII, which still contains over 6,000 controlled water heaters.

Fig. VIII shows the base curve with the addition of 30,000 two-element heaters operating uncontrolled. The result is a curve having essentially the same peak as before the ranges were removed, but with a somewhat better load factor because of the added kilowatt hours. Fig. IX shows the same base load with the addition of 30,000 single-element uncontrolled heaters and also the base load with the addition of 30,000 two-element controlled heaters. The two-element controlled heaters again produce approximately the same demand as did the ranges but the single-element heaters create a new peak in the morning that is 13,000-kw. higher than the former range peak. On the basis of this second comparison the amount of revenue brought in by the water heater should again exceed that brought in by the range not only because of the added peak capacity necessary but because of the much greater number of kilowatt hours used.

The third comparison involves determining the effect of adding water heaters to the system load as it now stands. Fig. X shows the Portland General Electric total system curve for November 28, 1938, with the addition of 30,000 two-element controlled water heaters. These curves show:

1. That the single-element heaters add practically as much to the system peak be-

† The range curve in Fig. VI is the integrated hourly demand obtained by the N.E.L.A. on tests on five groups of 100 ranges in different locations. The greater diversity found in this larger group of ranges, together with the addition of rural operation in which there is a noon peak, lowers the morning and evening peaks of the curve shown for the fifteen-customer group in Salem and maintains the noon peak at the same value but gives a more representative curve to use for the saturations prevailing on the system. The difference between urban and rural range use is clearly illustrated in studies made by the General Electric Company and shown in publication GEA-2058.

tween 5 and 6 p.m. as do the ranges.

2. That they create a new peak demand between 9 and 10 a.m. that exceeds by 20,000 kw. the former maximum system demand. And,

3. That the 30,000 two-element controlled heaters add nothing to the system demand but utilize otherwise idle capacity.

Since Portland General Electric now has on its system about 36,000 ranges and 6,000 controlled water heaters, this third comparison shows that it can add 100% saturation of controlled two-element water heaters, in terms of ranges, without exceeding its present generating system peak demand. Whereas, on the other hand, each single-element water heater that is installed will add essentially the same peak demand as another range besides using four times as many kilowatt hours. Any attempt to control these single-element heaters at a later date, would increase the peak still further as shown by the isolated peak value plotted between 8 and 9 p.m. in Fig. X.

The comparison of the range and water heater load that has been made in these three steps shows very clearly that the cost of service water heaters is greater than the cost of serving ranges, both because of the greater demand and the much greater consumption of the water heaters. A competitive rate (special low rate) to get the water heating business cannot be made without imposing a burden on other classes of service unless the cost of serving the water heating load can be sufficiently reduced to warrant it. The foregoing analysis shows that this reduction in cost can be accomplished by keeping the water heating load off-peak through the use of suitably designed controlled water heaters.

So far considered has been the effect of the water heater on the system only. The Portland and Salem tests provide data on the effect of single and two-element heaters operating controlled and uncontrolled on a distribution feeder and on a transformer. Fig. XI shows a maximum day load curve of Pepco's Hollyrood feeder, stripped of its 193 controlled water heaters. Using the maximum feeder peak which occurred between 5 and 6 p.m. as the limit, it is possible to add 56% saturation of two-element controlled water heaters in terms of ranges without exceeding this peak. A similar saturation of single-element uncontrolled water heaters increases the feeder peak by 256 kw. between 5 and 6 p.m., and also creates a morning peak which is slightly larger than the original evening peak. If the single-element heater were controlled it would create a peak exceeding the range peak of 529 kw. Fig. XI also shows the effect on the stripped feeder load curve of adding the controlled water heaters and also the effect of adding the uncontrolled water heaters, both on a basis of 56% saturation. Corresponding curve of the load of fifteen full-use customers in Salem are shown in Fig. XII. The effect of controlling the single-element heater is shown by the isolated peak value plotted between 8 and 9 p.m.

These curves indicate that the effect of the water heater in a residential area is reflected directly in the feeder and that for practical purposes in the Northwest, approximately 60% saturation of controlled two-element water heaters in terms of ranges can be applied to the distribution system without causing any expenditures for transformer or feeder capacity. The findings of other companies in the United States along this line are very similar. Constantine Barry of Philadelphia Electric Co. has suggested a figure of 50%, and in a recent article H. A. Snow of Detroit Edison Co. expresses the same opinion.

The foregoing relates to controlled two-element heaters, but when single-element heaters are used and operated uncontrolled, each heater increases the peak approximately the same amount as a range on both the transformer and the distribution feeder. It is, of course, impossible to control the saturation of water heaters on the individual transformer or feeder and the figure of 60% will probably be exceeded in many cases. If carried to 100% saturation in terms of ranges both the two-element controlled heaters and the single-element uncontrolled heaters will add to the transformer and feeder demand. However, the resulting demand with the two-element heaters at 100% saturation is only 67% of that resulting with an equal saturation of the single-element heaters. Even though the two-element controlled heater with 100% saturation will add to the distribution peak it must be remembered that it will not add to the system peak, and saturations well above 60% on individual feeders can often be economically served by putting otherwise idle power plant-capacity to work.

Thus we find that a first-class water heating service can be provided using two-element heaters with suitable control. These heaters, because they can be kept off-peak, cost less to serve, thus justifying a competitive rate for this service.

The tests in Portland have furnished supporting material for the data already available on sound electric water heating principles and practices. It is gratifying to find substantiation of the conclusions reached from the results of previous tests and the premises on which the design of modern water heating equipment and rates have been founded.

## Discussion

By M. F. HATCH
Washington Water Power Co.

WE are glad to have available a summary of some of the problems of the electric water heating practice as presented by Mr. Palo and Mr. Alger, especially as they have succeeded in converging the many different angles of this particular load that are so often incorrectly interpreted at random and as isolated problems. We are also glad to note that this paper confirms the water heating policies of the major Northwest utilities and in particular that of Washington Water Power, at a time when these policies are being subjected to a skeptical eye.

Washington Water Power has always pioneered in developing the water-heating service and has always led the Northwest utilities in the percentage of saturation of water heaters. One of the first and most important surveys of this load and its effect upon the serving systems was conducted by the National Electric Light & Power Association in 1926, largely through the instigation and cooperation of our company.

We have not deemed it advisable to make any recent surveys because there is such a wealth of material available. As already pointed out by the authors, the characteristics of water heaters are so well understood and in fact can be calculated, that further field tests of this nature will not bring to light any new information.

It is simply a matter of applying water-heater characteristics to the load characteristics of the system involved. Northwest utilities are so similar in basic load characteristics that the same conclusions as to the benefits of controlled water heating are almost bound to be reached by all of these companies.

Our company in particular has from the beginning recognized the importance of a fundamental low-wattage water-heating device with suitable off-peak control so that the costs to serve such a load are not reflected to any great extent in the distribution, substation or generating systems. We have noted with apprehension the experiments of different companies with a high-wattage single-element heater and also the experiments of different companies with operating heaters uncontrolled. In every case it has been gratifying to note that the results have been so conclusive that the high-wattage single-element heater has been dropped from further consideration, and that the policy of off-peak control can now be construed as being practically standard in the Northwest.

It is only necessary to compare the curves that have been derived by the authors, with a great number of other data available from different systems throughout the entire country, to concur with several fundamental conclusions. We should like to emphasize certain of their findings which have been confirmed through the experiment and reasoning of this company, as follows:

(1) The basic load curves of the Northwest utilities including the present range saturation, or any expected range saturation, are of such peaked shape that a great amount of demand can be furnished on a simple off-peak schedule without adding materially to the generation or distribution system peak demands. Our experience shows that the two-element water heater can be added until its saturation is equal to 60% of the range saturation before additional serving investment will be required.

(2) The diversified demand of a large group of water heaters of either the single-element high-wattage type, the single-element low-wattage type or the two-element type, when uncontrolled, is approximately 600 watts at the time of the evening peak. This is approximately the same diversified demand that is incurred by a large number of ranges. The uncontrolled water heater thus imposes about the same peak responsibility as the range and consumes about four times the energy of a range and as pointed out by the authors, clearly entails a much higher cost to serve, consequently its energy should sell at a materially higher figure, than if controlled.

It is therefore necessary to have available this 600 watts of diversified system capacity for every water heater if its control device is to be removed, and for a considerable number of heaters, a very sizeable increase in all system facilities will be required if water heaters are to be supplied uncontrolled. The cost of this extra capacity when considered as average or even progressive, is many times the cost of the control device and would require a large annual outlay by the utilities in system investment.

(3) As pointed out under (2), it would make practically no difference to the utility in cost to serve *uncontrolled* water heating service, whether the heater were one- or two-element type, high or low wattage. However, as can be seen from the authors' curves, it is impossible to apply control to any advantage whatsoever to the 3-kw. single heater; in fact, the resulting added peak to the basic load curve is greater, if controlled, than if not controlled. It is for this express purpose that the two-element type heater was designed, and is in common use today—its adaptability to control, thereby enabling the utilities to offer a low cost water heating service—yet a service which is ample and sufficient to meet the customers' every hot water need as completely as would a high-wattage uncontrolled heater.

## Discussion

By D. F. McCURRACH
Northwestern Electric Co.

This analysis, based on the Portland and Salem water heater tests, brings again to the fore certain fundamentals of storage water heating that must be apparent to those who have seriously studied this matter in connection with load building; namely:

1. The problem of how water heating shall be handled is one related to the character of load of each individual system.

2. It is obvious from the experience of those who have had occasion to make actual field tests, that a better water heater distribution of kilowatt hours, a better load factor and a smaller water heater peak obtains from two-element water heating than from similar capacity in one-element.

3. That neither the one-element heater, nor the two-element heater, can be operated uncontrolled without using up existing capacity or requiring the installation of additional capacity to meet the water heater demand at time of system and distribution peak.

4. That the necessity for peak control being established, the most economical load building will obtain from two-element heating as the secondary peak established is so much less than that of the single-element heater. Consequently, a greater saturation of two-element than single-element heating is possible on existing transformers, feeders, etc.

In fact, it is possible to have a 56% saturation, of two-element controlled heaters to ranges, without incurring a water heater peak greater than the range peak.

No justification exists for permitting water heating to operate uncontrolled with a demand per heater at time of system peak equally as great as that of a range.

The disparity in unit charges for these two classes of service would make the furnishing of water heating uncontrolled on the same basis as ranges, sheer discrimination. If we charge the same rate for water heating as for range service, it would mean simply that little if any electric water heating service would be sold.

Further contributory information on water heating would have been a record of the voltage conditions at the consumer's premises during controlled operation of single and double-element heaters, but neither the Portland or Salem tests furnished that information, so that we are without data on an important matter from the consumer's standpoint, whose supply of hot water may have been adequate but whose electric regulation may not have been entirely satisfactory, particularly from the effect of the demand created by the single-element heater after the release from peak control.

Of greatest interest in this report is the clear proof that the 3-kw. single-element heater cannot be used controlled on account of the demand created immediately after the control period which is much greater than the demand imposed by the maximum demand of the range.

To consider either of the two types of heaters operating uncontrolled is both economically unsound and wholly unnecessary as adequate hot water service can be rendered by two-element heaters operating under control and without creating a secondary peak greater than the peak of the range. This method also assures a high percentage of saturation of water heaters with respect to ranges, and a ratio of two ranges to one water heater would offer a large factor of safety.

## Discussion

By M. SEBERN
Fowler Manufacturing Co.

After digesting the available data on 3,000-watt single-unit water heaters versus the conventional two unit 2,500-watt water heaters, on the following points there seems to be complete agreement: (1) If either type heater is permitted to float on the line uncontrolled the diversified system demand at the time of the system peak is about 600 wattes. (2) If taken off the peak by some kind of control the system demand at the end of the control period is much less desirable with the 3,000-watt single-unit heaters than with the conventional two-unit heaters.

Now comes a logical question: Should water heaters be controlled to keep them off the system peak or should they be permitted to float on the line and impress a diversified demand of 600 watts each on the system peak?

Consider a water heater that will impress a demand of 600 watts on the system peak. The facts to be considered: (1) One privately owned utility is purchasing power from Bonneville. (2) At least one other privately owned utility says in its annual statement that it is

negotiating for Bonneville power. (3) Present Bonneville rates are based on a kw.-year basis. (4) The figure quoted is $17.50 per kw.-year.

Now if Bonneville power is purchased by privately owned utilities on the basis of $17.50 per kw.-year, the cost for Bonneville power to serve a water heater that has a 600-watt will be $10.50. If this water heater were off the peak this power cost of $10.50 per year would not exist. Hence an addition to earnings of $10.50 per heater per year.

At this time I am not considering the effect on the distribution system of on-peak versus off-peak water heaters. But it seems obvious that if the $10.50 per heater per year is to be paid for power alone there should be other features in the use of on peak heaters to compensate for this expense.

I believe the industry should know of the savings (if they exist) that can be made by use of on-peak heaters.

A. C. KELM: This paper shows the effect on the system load curve of adding any number of water heaters. Conditions differ with different companies. What a company wants to do about taking on water heater load depends to a large extent on how much generating, substation and distribution facility it has. The question seems to be whether to spend money on control in order to save investments in generators, substations and lines. Load conditions of the industry are changing. Conditions ten years from now may be wholly different from today examine all conditions carefully to make this decision.

G. M. PALO: (In answer to question as to the effect of putting the range and water heater on a double-throw switch). The range and water heater studies of the NELA in 1925-26 found that the double-throw switch produced very little reduction in the diversified demand of the water heater or of the water heater plus the range. About the same results come from the use of a peak limiter. The question of what type of water heater to promote depends largely on the cost of control. If a competitive rate is given to water heating to put it on a competitive basis with other fuels, you will need a separate meter to measure the water heating use. Thus the only extra cost will be in the cost of time control. The size of the storage tank depends on the amount of off-time you apply to the water heating service under the rate you adopt.

WALTER BRENTON: The peak limiter has the effect of wiping out whatever diversity exists in the electric range load. You can save only 100 to 150 watts per water heater by using this device.

It is up to the individual company to determine for itself how to meet the problem of adding water heater load, taking into consideration the volume of the load desired, the basis on which the load can most readily be sold and the effect of the load on the company's generating and distribution system. Sales resistance has a bearing on this. It is higher in the case of a two-element heater with thermostatic control and with a large tank to take care of storage for the off-time period, than it is for a simplified system with one heater and a smaller tank.

# Adequate Wiring Specification Sheet

By H. C. BENDER
Washington Water Power Co.

SALES of electrical appliances have been doubling each 2½ to 3 years, so it is about time some very serious consideration be given to adequate wiring.

The electrical contractor is generally not a salesman. By and large, he has taken the path of least resistance and sold what he could, and many have pulled down any attempt at an adequate job just to get the work. Many contractors tell a builder that he can get along without outlets here and there in his home and thus save money. All builders are gullible to such a line of argument.

Our first problem, then, is to start in with the electrical contractor and get him in a different frame of mind toward his business. He wants to make a profit, believe it or not, but he feels he will lose out altogether unless he can sell on a price. He will figure the cheapest materials and devices and cut down on labor. As one contractor said "I didn't charge any mileage on my truck because I had to have that anyway."

I agree with your thought that anyone figuring that way is certainly dumb, but I wonder if this is any worse than a thousand and one things that other contractors do to kill business. And consider this fact - there are no electrical contractors that have made a fortune in the business, and too many have not even made a good living.

The electrical contractor is not entirely to blame because we, in the utility, have helped in holding him down and assisted in knocking the profit out of his business. We have been too interested in selling lighting and kilowatt hours and in shopping around to get the cheapest wiring job for our customers. Every electrical salesman has been guilty of that practice and therefore has created a lot of ill will among the contractors. If we are to encourage the contractors to sell adequate wiring, let us insist that he make a reasonable profit on every job that we have anything to do with.

The builders and finance institutions also have held wiring to a minimum. The speculative builder, especially, has put in as cheap a job as possible, thinking that whatever he can save here, makes his profit that much more. To the loaning institutions, a wiring job is a wiring job regardless of whether it cost $50 or $250. The same reasoning has held in the matter of the heating plant. A furnace is a heating plant regardless of its adequacy or economy.

I have wondered why the Engineering Section of this Association would bother about "Utilization Devices" because its problems are generally on the other side of the meter, but in the final analysis everyone, regardless of his work, is tremendously interested in seeing that the current which is produced is being used and used at a profit.

The National Adequate Wiring Bureau, for its first year of activity, is doing an outstanding job. In Spokane, we formed a local adequate wiring association among the electrical contractors in order to make fullest use of the advertising materials they have developed. In addition, we undertook a little project of our own. We have always known that the electrical paragraph in the ordinary building specifications did not mean much. It hardly took up an inch or more of space in the sheet and was so worded that a contractor could do just about anything he chose. The lumber industry knew this and was willing to use a form of electrical specifications, if we could develop one that would never be over one page in length. Such a form was developed, built around these objectives:

1. A specification that could be universally used by builders of small homes—for one outlet or an hundred—either on farm or urban territory.
2. To make it possible for the inspector, owner or loaning institutions to check a wiring job and know what was going into it.
3. To encourage modern wiring methods and the use of standard devices.
4. To improve contractual relations between owner and electrical contractor.
5. To encourage an owner to provide for every possible use of electrical energy.
6. To make certain recommendations that would make for improvement in any job and so encourage an owner or builder to look for these improvements in wiring technique.

We have seen some results from our

first effort. The loaning institutions have shown a decided interest. In presenting the specifications to them, samples of wiring devices, both sub-standard and standard quality, were dissected. Wire of different sizes and makes was shown and the cost of items and wiring explained. They were told how to check on the reasonableness of a wiring contract and how a wiring installation could be checked after installed. Without exception, every institution was willing to have this information and willing to cooperate in suggesting that the forms be used in all specifications coming before them for loans.

There are in every large community, a lot of wiring contractors who sell on price and have to use sub-standard devices and who will not cooperate in any endeavor. We cannot force these people to take any part but by advising with the banks, we feel we can accomplish the same objectives. Many of our contractors are making every effort to sell on adequacy rather than price; since we started this program, they report the percentage of jobs sold on adequacy is steadily increasing.

Another result is that the owners are satisfied with the wiring job. When you can show an owner that his wiring totals, for example, 100 wiring positions and you actually show him the list and their positions in his home, he is in a better frame of mind to pay, for example, $200 for the job. If it was just stated in the contract that $200 was allowed for wiring, he would think he was being robbed. We have also seen a definite build-up on the number of outlets, ranging from 15% to 50%. The most gratifying phase of the problem is that the owner is entirely satisfied.

The FHA office has also shown interest and would like to use such a form. Under the present checking procedure, an inspector cannot check the wiring satisfactorily. He can check the other features, but he has been in the habit of passing the wiring, regardless of the job, because there was nothing to go by. With this help, we can expect a further use of the form with its resulting advantages.

We have also noticed in using this form, that there are fewer omissions of vital outlets for specific purposes.

In wording the form, we attempted to make it as clear as possible so that a layman could read it and define what was included in the contract. We believe we have eliminated one source of misunderstanding by defining "fixture" and stating who was to hang them. In every part, we have attempted to improve contractural relations and the results, so far, indicate that this has been accomplished.

We are encouraging the use of CNX wiring, and several jobs containing this material are in Spokane, but none where the State Inspectors have control. We are assured that the 1939 code revision will eliminate this controversy and will permit its general use. We have also asked all contractors to use the code as a "safety valve" and not as a treatise of adequacy. We have read the first paragraph in the "Introduction" on Page 6 of the code to every banker and builder and explained that the code only covered one of the four aces of adequate wiring, namely "Safety." The code has nothing to do with Adequacy, Economy or Convenience - the other three aces.

We believe the form should be kept to a single sheet because it will have better acceptance by the builders of small homes. It can be put in pad form. We have no copyright on the form, so anyone is free to use it. We soon will have a new supply so we will gladly furnish pads to anyone at our cost.

# Data Sheets on Commercial Eqpt.

By A. H. GREISSER
Portland General Electric Co.
And HENRY BERK
West Coast Power Co.

SALES engineering costs are relatively high on many specialized commercial and industrial electric equipment installations. In some cases, experimental units, such as electric heaters, have been built in order to solve the problems involved. However, "cut-and-dry" methods and trial installations are costly; and such expense frequently may be eliminated by the interchange of ideas and experiences on the part of the engineering and sales department organizations of the various electric utility companies. The ideal medium for exchanging information is the "Sales Data Sheet."

At the November 1938 meeting of the Commercial Cooking and Heating Sales Section of the Association, a prize contest plan was announced for encouraging the preparation of commercial and industrial heating data sheets. To date, the response to the plan has not been encouraging. In our opinion, every effort should be made to support the data sheet program.

Pooling of information on electric heating and cooking installations, through the medium of "Data Sheets," will reduce sales promotion expenses and will aid in the development of more *net* profit for our companies.

For maximum benefit, the sales data sheet should present accurate and complete information. Specialized applications of electric heating energy, for example, may be described in sufficient detail so that modifications or slight changes in the electrical equipment will point to the solution of a heating problem for an entirely different material or process. It is impracticable to establish a fixed rule or outline governing the technical features to be covered in each data sheet; but the following analysis based on certain specific data sheets, is offered as a guide:

1. Dimensions of tanks, ovens, heating frames, etc. are ordinarily essential.
2. Chemical and physical properties of material heated should be presented. In the case of liquids, the particular information desirable is: (a) specific heat, (b) viscosity, (c) corrosive properties and (d) limits of temperature to which the liquid may be subjected.
3. In the case of liquids with low specific heats, the electric heaters should be dimensioned, or the wattage-density or surface temperature be given in the data.
4. If control devices are essential in the successful operation of the electric equipment, the data sheet should indicate the location, type, and capacities of the controls.
5. Type and thickness of heat insulation should be specified.
6. Any unusual mechanical stresses, heat concentrations, or other operating characteristics which affect the equipment design should be noted.
7. It is helpful to secure information on special materials used on account of corrosive properties of liquids or gases.
8. Safety conditions to be met in the design or operation of the equipment should be noted.

Since the basic value of a sales data sheet is economic, all essential cost factors should be presented as outlined in the "master data sheet" prepared by the data sheet committee of the Association. Enlarging on that outline, the economic data should include:

1. Equipment investment costs in sufficient detail to permit adjustments for other similar electric heating installations, and to indicate those costs which are common to a competitive fuel-fired installation.
2. Operating cost data should cover a period of time which compensates for any seasonal or other variables affecting the operation.
3. Reports on electric energy usage in terms of product or time units, may be expanded to show operating cycles, stand-by or idling losses, etc.
4. Losses of liquid by evaporation or by adherence to materials processed, conveyor belts, etc. which are an integral part of the equipment, should be indicated.
5. It is essential to report labor costs in such manner that comparable charges for fuel-fired equipment may be determined.
6. Values for equipment depreciation are important in many installations because of the higher relative depreciation of competitive devices.

In the foregoing comments, we have

stressed the need for adequate and complete information on existing equipment installations. Our customers are "electrically minded," and the problems we are frequently asked to solve involve considerable time and expense, which can be eliminated or materially reduced by free interchange of ideas and experiences in this geographical area.

# Heating, Conditioning Small Homes

By WALTER SMITH
Mountain States Power Co.
And J. E. YATES
Pacific Power & Light Co.

EVERY home in the Northwest area requires heat during winter, but we have not yet reached the plane of living where summer cooling is a necessity. Therefore, it seems desirable to discuss this subject under two headings; first, electric heating; second, air conditioning.

### Electric Heating

Two types of electric residential heating are in use today; first, those employing a space heater permanently installed or portable to warm a small space, such as the bathroom or breakfast nook, supplementing the major heating equipment. This may be designated as the portable type when contrasted with the second, or central type. In the central type, heat is generated at some central point and distributed to the space, using water or air as the vehicle of transmission.

Three factors influence the choice of any residential heating installation; first, the cost of equipment; second, annual operating expense; third, the automatic features controlling the operation of the equipment. The first cost of the equipment and the annual operating cost will in the majority of homes decide the method by which the home is to be heated. Automatic equipment is given only minor consideration because many individuals prefer the inconvenience of manual firing and control rather than pay additional cost for automatic control features.

Electricity is utilized for residential house heating by three methods: (1) Direct—wherein heat is generated by resistance units using air or water as the medium of transfer. Cost of the direct installation is reasonable compared to comparable equipment using gas or solid fuels, but under present economic conditions, the annual operating expense is not competitive. (2) Storage—where the heat generated by resistance units is stored in water or solid materials during off-peak periods and released for heating as required. First cost is higher than the direct method. Likewise the efficiency is somewhat lower due to losses involved in storing. It does have the advantage of being able to utilize off-peak energy. (3) The reverse refrigeration cycle—wherein a refrigerant is circulated through coils exposed to outside air to absorb heat then to a compressor where the heat is released and transferred to the space to be heated. The cost of equipment is high. Quantity production will reduce the cost but it is doubtful if it would bring the cost within the price range of competitive methods. It does have the advantage, particularly in mild winter climates such as are experienced on the Pacific Coast, of a heat ratio of 4 to 1.

The relative prices of fuels will affect the type of equipment. A recent survey in Portland indicated that 72% of all dwelling units were heated with wood or wood products, with 50% of the dwelling units making use of hot-air furnaces and 35% hot-air stoves. Gas in Portland can be obtained for house heating at reasonable costs. The price of oil is also in a competitive price range.

The home owner, if he is to be persuaded to install a different type of heating, must be convinced that the new equipment will do a more satisfactory job either through better application or at a reduced operating cost. Electricity for heating is subject to exacting control, but no more so than are gas or many types of solid fuel.

A 5-room house in Portland can be heated with a central unit using gas for a very reasonable annual cost; oil, under present prices, at approximately the same annual cost; wood for somewhat less, and sawdust the least expensive of all. Sawdust, although having a price advantage, has certain unfavorable features; the supply is limited, it require as large storage space, the quality of fuel varies, and for satisfactory operation must be given an appreciable amount of manual supervision.

Studies indicate that if electric heating is to be sold on a competitive basis in Portland, it must be delivered to the residence for such use at a price of 2½ to 3 mills per kw.-hr. Upon this factor alone depends the extent to which electricity will be used for residence heating in the Northwest.

In order to make it possible to sell electric energy for house heating at a cost comparable with competitive fuels, users must be developed whose energy requirements will dovetail with the heating season in a manner that will use the kw.-hr. not required for heating as available, thereby producing an overall load factor from the combined operations approximating 100%, and the delivery of which can be made by the utility without too much additional investment in distribution facilities. Electricity is so cheap today that its cost to the householder or to most industrial enterprises represents such a small per cent of the total cost of keeping up the home or operating the business that complying with any such time schedule to effect a saving in the costs of energy is not warranted.

The trend in home construction today indicates a tendency toward the installation of permanent space heaters for the bathroom and breakfast nook, supplementing to this extent the major heating equipment. Such use of electric heating seems to be economical and not excessive in its daily peak requirements.

Present conclusions are therefore that electric energy for house heating in the Northwest is not economically feasible on any program other than as a supplemental heating agent, due largely to the inability to compete with the cost of other fuels.

### Air Conditioning

Two types of air conditioning installations are suitable for residence use today. The first is the small individual portable unit which can be transferred from room to room. Second, is the central unit, which can be used to cool a portion or all of the space. In homes where a duct distribution system is used for heating, the same distribution system can be used for cooling, if properly designed. Homes employing hot-water or steam heating facilities require separate distributing facilities for cooling.

The market for air-conditioning equipment in the Northwest is not competitive, as is the case in electric heating. To date, residential cooling is largely a question of comfort. It is considered a necessity. This factor will unquestionably control the marketing of this equipment.

Present day trends in the manufacture of home cooling equipment are centering on the small portable unit. This year manufacturers plan on producing the small unit in larger sizes varying from a fractional ton up to 10 or 15 tons. If this program is carried out, it will affect the trend to a measurable extent. The small unit can be used for individual room cooling or it may be permanently installed in closet space with distribution to adjoining rooms or to other rooms through a short duct. Thus, the installation can be made quite flexible and the first cost reduced without sacrificing a satisfactory job.

The coolest portion of the day occurs at daybreak and the warmest during the late afternoon. The cooling load,

therefore, would be comparatively light in the early morning hours and through the forenoon. Cooling would be required on warm days during the middle of the day, gradually increasing as the day progressed, reaching a peak during the late afternoon and continuing throughout the early evening hours. On such a schedule, its power requirements would coincide with the dinner cooking hour and the evening lighting peak. In addition, the cooling season would be comparatively short, resulting in a low annual load factor.

Electric heating and residential air conditioning when considered individually do not represent satisfactory load conditions from the utility standpoint. The annual peak requirement for heating is comparatively high; its load factor low. Its general adoption over an area including a considerable number of homes would require large annual peaking requirements, thereby entailing an expensive distribution system. Electric portable heating equipment supplementing the major heating system coupled with summer air conditioning would make a more desirable type of load.

Briefly, in considering this problem of electric heating and air conditioning for small homes, present trends indicate that competitive fuel prices prevailing in the Northwest will limit the use of electricity for house heating largely to selected rooms, supplementing the main heating unit. Residential air conditioning, as soon as it receives public acceptance, will undoubtedly be in public demand and will not greatly exceed the peak for heating requirements. Such use should be economical to the user and should not impose critical loads on the utility furnishing the service.

## Discussion

T. J. MELLON: Insulation is important in any consideration of the rate to apply to electric heating. With insulation, in the Tennessee Valley where climatic conditions are something like those of the Northwest, a rate of ¾c to 1c per kw.-hr. has proved to be a business producer from a competitive standpoint.

As to heating the walls of a room, this method has been tried abroad. It is not entirely practical from the cost standpoint, and, of course, this method is restricted to new buildings. There is a large field for auxiliary heating in commercial installations. In this type of heating, in which there are less losses than in any other type, you get a diversity not possible from central heating.

W. B. BRUERE: Panel heating had its inception in Sweden, England and Switzerland. The electrical characteristics of this load are not acceptable here. Electric heat will always demand and receive a premium. We do not need to compete with other fuels on a straight B.t.u. basis.

H. V. CARPENTER: The theory behind wall heating is that if the walls are warmer than the rest of the space, we will not feel the chill. The method does not, however, seem economically practicable now. Good insulation cuts radiation losses in half. Every step toward cutting radiation losses is a step toward the practicability of applying the method of heating the walls.

G. M. PALO: The idea of balancing summer air conditioning against winter heating with the reverse refrigeration cycle is aided by the fact that if a customer puts in cooling equipment it will take little additional cost to install reverse-cycle heating.

J. E. YATES: In the Northwest the ratio of reverse refrigeration heating is normally about 4 to 1. If the temperature gets down way below zero, the ratio approaches 1 to 1. The price you can get per kw.-hr. for direct heating depends on the fuel habits of the community. If we were to attempt to secure a large heating load in homes in the Northwest, we would need a rate of from 2½ to 3 mills.

# Power Production Committee*

## Dust Removal

### Economic ways of taking dust, fly ash, etc. from stacks

By JOHN MacEWELL
Puget Sound Power & Light Co.

APPARATUS used in power plants for collecting dust, fly ash and cinders falls into three main classes: electric precipitators, wet washers and dry collectors.

Qualifications of an ideal dust and cinder removing apparatus are:

1. Low investment.
2. Low operating expense.
3. Light weight.
4. Low draft loss and energy consumption.
5. Simple construction.
6. High percentage of dust removal.
7. Equal effectiveness at all loads.
8. Equal effectiveness on all types of dust.
9. Possibility of removing sulphurous acid.

Electric precipitators, because of their effectiveness, are favored in Europe and the United States for central stations which burn pulverized coal or use forced draft stokers. Operators have hesitated to install this type of equipment because of the large investment, excessive weight, and space required. Recently improvements have been made in reducing the weight of this equipment and pulsating direct current, such as is obtained by half-wave rectification of two phase alternating current, is used. The half-wave type of rectification has proven more effective than rectified polyphase current, but costs are still high. The Cottrell precipitator, mentioned above, is manufactured by the Western Precipitation Co. in Los Angeles.

American Air Filter Co. of Louisville, Kentucky, is experimenting with a low-voltage precipitator which will have low investment cost and overcome difficulties that have made this type impractical for large installations. For electric precipitation to be efficient, it is necessary to install the precipitators in a series of groups, and by using low gas velocities, 90% or more of the dust and fly ash is removed.

A Cottrell high-voltage precipitator can be installed without fan equipment for approximately 65c per cu. ft. per min. Cost and effectiveness of low-voltage installations have not been obtained.

Wet washers in Europe and this country have been, until recently, of home manufacture and have met with various degrees of success. Generally, they have accomplished their purpose. The dust washer at Western Avenue Station in Seattle, has been in service since 1919, and has required little maintenance. This is not used on the boiler stacks, but catches fine dust discharged from large-diameter cyclones used in connection with drying coal before it it pulverized. The washer is a concrete box approximately 13 x 13 x 12 ft. with wood deflecting plates and water sprays. It handles approximately 30,000 cu. ft. per min. and recovers 250 lb. per hr. of dust which has approximately 60% combustible and is washed into the sewer as a complete loss. At

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present, we are considering dry separation equipment in place of the washer in order to burn dry dust in the furnaces. Maintenance costs are low, because of the small percentage of sulphur in the coal which causes corrosion.

Portland General Electric Co. has two cinder washers in Station L where the boilers are fired with hogged fuel. The washers are located in each case between the preheater and the induced draft fan. One washer on the 1,650-hp. boiler was installed in 1927 and the other on a 2,650-hp. boiler was installed in 1930. It is claimed the washers effect practically 100% elimination of cinders and fly ash, but maintenance is high, because of corrosion of the eliminator sections and wear of the reclaiming equipment. From the washers, the mixture of cinders, fly ash and water is passed through Oliver rotary filters to remove the cinders from the water. The cinders are then returned to the furnace by conveyors, and the water is wasted.

Among manufacturers who advertise dust washers are American Air Filter, Claude B. Schneible Co., and Riley Stoker Corp.

Gravity settlement alone of dust particles for dry collecting has been found to be impractical and uneconomical for large boiler plants. At a velocity of 40 ft. per sec., which is common in boilers and ducts, it is claimed particles over 20 mesh only will settle out.

In answer to a questionnaire, the Electric Park Plant of Grays Harbor Railway & Light Co., at Aberdeen, Wash., reports a settlement chamber. The gases on leaving the boilers drop vertically through economizers to a 140-ft. tunnel. An induced draft fan carries the gasses out of the tunnel and through a 100-ft. stack. As the tunnel is also the sump pit for the plant, an automatic sump pump is used to discharge the drainage water and soot 200 ft. away for filling in low ground. Every two or three months soot which has not been lifted by the sump pump must be shoveled from the tunnel.

This settlement tunnel has proven to be more practical than ordinary settlement chambers in that the large particles of fly ash are precipitated in the tunnel, while the fine dust, when leaving the stack, is carried well away from the surrounding neighborhood by favorable wind. Draft loss and maintenance costs were not mentioned.

The U. S. Bureau of Mines is experimenting with a method of settling dust and fumes by passing the air or gas through tubes in which standing sound waves are established by the use of a shrill whistle or magnetostrictive generators. The process works best when the wave length is approximately equal to the diameter of the tube. For a tube of practical diameter, frequencies will vary from 3,000 to 20,000 cycles per sec. Vibrations between 5,000 and 16,000 cycles per sec. are in the audible range so this type of operating might create considerable disturbance.

Coagulation of the suspended particles is brought about by collisions during their complicated movements between nodes. The heavier, flocculated masses finally collect at the points of no motion—the nodes. The Bureau has applied this treatment to smelter fumes with success and is now developing the apparatus for the purpose of general smoke and dust abatement; as far as we know, no installations have been made on boiler plants to date, but such would seem to have possibilities if frequencies can be used outside of the audible range.

In dry collectors, manufacturers recently have attempted to increase the percentage of dust removal with less energy consumption by means of centrifugal separators.

Manufacturers have experimented with induced draft fans which extract cinders through devices in the inlet boxes or around the scroll or by separation deflectors on the plates. Until recently, with such installations under ideal conditions, it has been almost impossible to obtain collection efficiencies higher than 70%. They have been found to work more satisfactorily on coal cinders than hog fuel cinders due to the density of the cinder.

American Air Filter Co. has a precipitator of this type called a Roto-Clone which uses a small cyclone in combination with the fan in which some gases are recirculated. Collection efficiency of 85% is claimed.

Installation cost of a cinder-catching fan is approximately 24c per cu. ft. per min. or about double the cost of an ordinary induced-draft fan. Some operators believe that cinder catching fans, especially for coal, are likely to have excessive wheel wear because of the type of blades used, resulting in costly replacements. The maintenance for a cinder catching fan might in a short time make up for the added first cost of an installation having induced draft fans discharging into a battery of small cyclones or multi-cones.

A number of plants in the Northwest which are burning hogged fuel remove the cinders with cyclones and induced-draft fans. Among these are Lincoln Station, Northwest Electric Co.; Coos Bay Station, Mountain States Power Co.; Station L, Portland General Electric Co., and South Baker Plant, Eastern Oregon Light and Power Co. All have proved satisfactory in operation and have stopped complaints. First cost has been within reason, and roof installation does not take up valuable space. At light loads, cinder cones have a stack effect, but at high ratings there is considerable draft loss. Some companies have experienced more maintenance than expected because of corrosion from flue gas condensation. Cold weather brings difficulty in removing the cinders from the cones because of moisture. Ordinarily, reclaimed cinders are dry and therefore have more available B.t.u.'s.

Western Precipitation Company of Los Angeles, has an installation of multi-clones and induced draft fans in the British Columbia Sugar Refining Co. plant at Vancouver. Multiclones are small diameter (approximately 9-in., cyclones arranged in groups through which the gases are passed. These groups are cut in or out of service depending on boiler load and amount of gas handled. Good efficiency of 80% to 85% with this equipment requires expert operation of the dampers. There is a high, variable draft loss of 4 to 5-in. Installation cost is approximately 28c per cu. ft. per. min.

American Blower Corp. recently installed dry collectors on the new pulverized fired boiler at the University of Washington. At the time writing, it was learned that acceptance tests were quite successful, removing about 80% of the dust. In this type of apparatus, the gases first pass through horizontal, spiral cylinders, which remove a large percentage of the dust or fly ash on its way to the induced draft fan and stack. The concentrated dust, caught in traps at the end of the horizontal spiral cylinders with a part of the gas, goes to a cyclone where the dust is further separated from the gas. Gas from the cyclone is then returned to the start of the horizontal spiral cylinders by means of a small induced fan. The dust collected at the bottom of the cyclone is discharged through an unloading valve into a sluice and washed away to fill in low ground. The installation cost of this equipment is approximately 27½c per cu. ft. per. min.

A type of dry collector new in this country, manufactured by Buell Engineering Co., is known as the Van Tongeren system in Europe. This apparatus sets up eddy currents which combine with centrifugal action to obtain separation. The gas to be cleaned enters the primary centrifugal chamber of the unit wherein 85% of the gas is cleansed while traversing the internal vane system for a radial exit to the stack.

The balance of the gas sweeps the dust concentration through a communication slot in the outer casing of the primary collector to a secondary collector which is an especially designed cyclone of the shave-off type. They guarantee that the eliminator will collect 97% of all ash particles having sizing of 43 microns, 325 mesh and above, and at least 90% of all particles having sizing of 20 microns, 625 mesh and above. No information was obtained as to the installed cost and draft losses, but we assume they are in line with similar equipment.

Advertising and reading material on dust and fly ash collection are stressing the value of high percentage collection or just collection of particles within the nuisance range which may be all sizes of particles down to 30 microns (500 mesh) or 20 microns (625 mesh). However, local conditions determine the nuisance of the dust and fly ash, depending on height of stack, velocity and di-

rection of the wind or characteristics of the fuel.

Table I shows a difficult sizing analysis of a pulverized-coal, fly-ash sample so that one can see the difference between high, or 100%, elimination and just eliminating the coarse particles.

**Table I—Fly-ash Analysis**

| Larger than | Smaller than | Percentage |
|---|---|---|
| 297 microns | .... | .... |
| 149 " | 297 microns | 2.5% |
| 74 " | 149 " | 6.5% |
| 43 " | 74 " | 21.0% |
| 20 " | 43 " | 15.0% |
| 10 " | 20 " | 20.0% |
| 0 " | 10 " | 35.0% |

(1 micron is equal to 1/25,400 of an inch)

Ash particles of usual annoyance on desk papers, and household linens range from about 60 to 200 microns. Particles of 30 microns are extremely small and beyond the visibility of most eyes. What damage these invisible particles may cause to one's health should come from a member of the medical profession. It is certain that the public is very apt to form an unsatisfactory opinion if they see even a small fraction of dust being emitted from a chimney.

Table II shows the action of fine dust emitted from a chimney 200 ft. high.

**Table II—Dust Travel**

| Sizing of fly ash particles | | Time to fall 200 ft. in still air. | Miles to travel in 5-mi. breeze while falling 200 ft. |
|---|---|---|---|
| Microns | Sub Mesh | | |
| 20 | 625 | 0.715 hr. | 3.58 mi. |
| 10 | 1250 | 2.40 hr. | 12.00 mi. |
| 5 | 2500 | 9.20 hr. | 46.00 mi. |
| 2 | 6250 | 85.00 hr. | 428.00 mi. |

There is a noticeable lack of test data that can be applied for all types of fly-ash-removal equipment and no apparent uniformity in the method of testing. The Buell company has a European method which appears to be simple and quite complete. Consumers Power Co. used an adaptation of this method on dust samples in connection with its stack washers. Western Precipitation Corporation has Bulletin W. P. 50 on gas and dust measurements.

Fly ash and dust disposal of fly ash and dust, after being finally collected, presents a problem at locations where there is no available ground to fill in. The February 1939 issue of *Electric Light and Power* has an article on the use of certain percentages of fly ash with cement for making concrete. A most recent use is selling dust to garages to absorb oil and grease on the floors.

If there is no use for fly ash and dust in the dry form, it is generally mixed with water and disposed of with the regular ash from furnaces.

In conclusion, it is evident that the ideal dust, cinder and fly ash eliminator has not been found. So far, the electric precipitator is quite effective but has a high installation cost. The wet washer is also effective but occupies considerable space and is heavy. The dry collectors are not as effective as the other two in that they have variable efficiency depending on quantity and nature of the dust. Operators who burn hogged fuel in this region are getting along fairly well with dry collectors and should they change to coal burning, consideration of dust and fly ash elimination may become an important factor in power plant equipment.

Depending on conditions, perhaps a combination of the dry collector with the electric precipitator or the wet washer might result in the most logical development. Something new and not yet tried in a central plant is the manufacture of dry ice and liquid $CO_2$ from the flue gases. The demand for these products is rapidly increasing in the United States, and the sale might pay the first cost and operating expenses for the dust eliminating equipment.

# Governor Tests

By W. A. HILL
Washington Water Power Co.

IN all, five governors have been tested, and these by no means exhaustively. Two of these are at Long Lake station, Washington Water Power Co. and are normally under the influence of the automatic frequency controller; two more are at Chelan Plant; the fifth is at the Nine-Mile station, on the Spokane River just below Spokane. The paucity of present data makes it impossible to draw general conclusions with respect to either the most advantageous type of governor to be employed, or the proper adjustments to be made in order to attain the best possible coordination for unified operation.

Superficial examination of the evidence indicates that, under certain circumstances, and with equipment in general use, attempts to meet requirements with respect to one phase of the problem may react unfavorably in another direction. In short, it is believed that before the general approximate solution is found, current design practice may have to be rather broadly modified.

Tests on the two Chelan units, and No. 4 unit at Nine-Mile plant, indicate that the general operating behavior of these units is characterized by definite stability under interconnected loading. Altering the various governor adjustments from their usual, or "normal" settings effected no noticeable changes in unit behavior. That these adjustments actually influenced isolated governor performance was plainly indicated by the changes in mean speed and stability which accompanied them, when the various units were taken off the line. Moreover, this stability, under normal load conditions, seemed to exist without any discrimination against those governors which were obviously not in as good mechanical condition as the others, in spite of the fact that these mechanical discrepancies exercised a very definite influence in the case of unloaded units. The natural assumption, then, is that moderate mechanical impairment, or adverse adjustment are ineffective as long as the actuating speed variations are confined within a comparatively narrow band. It is reasonable to expect that, of the three general governor characteristics of sensitivity, activity and stability, the two latter assume a subordinate position to the first.

When a fairly good idea of individual governor characteristics may be gained from no-load operation, it is virtually impossible, in many cases, to subject a unit to testing under individual load. This is, presumably, the condition for which the present mechanical governor is designed and, where it is possible to assign a unit to an individual load of sufficiently low load factor to fairly cover the range of the unit tested, it would be advantageous to do so.

In the case of frequency variations of greater amplitude, such as occur on the W. W. P. system, when separated from Puget Sound Power & Light, loading on the tested units was steady despite the fact that definite governor responses to speed variation were indicated. Such load changes as were shown, were generally smooth and moderate with no evidence of protracted hunting. Here again, it is probable that altered governor adjustments have little, if any, effect upon unit control, because the range of speed variation is still too slight to produce corrective action of any magnitude.

Considering the fact that, under all operating conditions, the most beneficial utilization of power resources dictates the retention of practically uniform load on some units, and the absorption of demand fluctuations by others better adapted to that function, it is conceivable that the relatively insensitive governor is admirably suited for use in typically base load plants, where it may be relegated entirely to the role of an emergency shutdown appliance. Furthermore, such a condition should tend to stabilize interplant ties through the effective elimination of compensatory hunting between units. If applicable at all, this assumption should be just as valid with

respect to interconnected systems. While it is not meant to deprecate the value of recent improvements in governor design, the realization of this end, with the employment of highly sensitive apparatus, would necessarily entail commensurate refinement in compensating adjustments and the adoption of a relatively steep speed droop.

In the course of the tests of Chelan units, the testing meter was connected to the Wenatchee tie line in order to determine the load oscillation amplitude on that line. These oscillations, with a period of approximately 2 sec., developed a total amplitude of about 7,000 kw., and were definitely synchronized with the secondary frequency waves simultaneously recorded on the same chart. Upon transferring the motor to the units in turn, however, it was found that a reflection of these oscillations could not be traced with any certainty on the load line. If they existed here, they were so small in value as to be obscured by a heavier vibration which seemed to be a characteristic of both Chelan units. These vibrations varied recurrently from 0 to a maximum of 1,200 kw. at a period very close to 0.6 sec. There seemed to be, moreover, no regularity in the occurrence of nodes.

This phenomenon could not be linked with the tie-line vibrations, and the existence of any relationship between them can not be proved until such time as isochronous records of both elements can be secured. The charts of both units, though taken at different times, gave no evidence of mechanical hunting for balance between units. Whether or not the rapid load vibration, noted above, was of a compensating nature between the two units themselves could not be determined with the equipment at hand. Simultaneous high speed charts might throw some light on this matter.

The unit tested at the Nine Mile plant, where old Lombard governors are in service, showed normally steady regulation. At this point, a portion of the run was made with the meter load pen recording the total station output, while the pilot valve and gate position recorders remained on the No. 4 governor. The coincident regularity of the tie-line load and the negligible mechanical action of the governor, gave fairly conclusive evidence of general plant stability. Visual observation of the behavior of the other two units in operation confirmed this fact. The Nine Mile plant responded to the wider frequency of variations, occasioned by severing the connection with the Puget Sound company, in a very moderate and well controlled manner. The record here, as at the Chelan station, points to the conclusion that these two stations at least, while responding to wide frequency variations, do so in a well controlled manner and, under normal operating conditions, cannot be held responsible for the inauguration of any system disturbances.

Reverting briefly to the Chelan units, and more particularly to Unit No. 2, the appended test notes record the fact that a well marked tendency exists for the units to continue to drift, for some time, in the same direction as any manually imposed load change. This fault, however, is generally corrected by the operator in the control room by means of a short kick-back with the synchronizing motor. The exact regulatory element responsible for this fault has not been determined as yet, but, in any event, the rejection or assumption of load, as the case may be, is so gradual in its progress that it can hardly be a generally disturbing factor.

The two units on which test runs were made at the Long Lake station exhibited, in general, very similar characteristics to those noted at the other plants, when being operated under similar conditions. With the frequency controller removed from service, and the governor action uninfluenced by any outside agency, the units carried comparatively steady loads and responded smoothly to such load changes as were imposed upon the generator. Considerable latitude, in adjustments of dashpot, speed droop and restoring mechanism, was possible without affecting the stability of the units appreciably. Furthermore, when unloaded and taken off the line, both units showed better speed control than the others which were tested. Unit No. 2 was conspicuous in that, with proper adjusting, it could be made to eliminate all hunting within a very short time after its stable speed had been deliberately upset. No. 4 unit, while regulating to a total amplitude of about 0.4 cycle, could not be adjusted for further damping of the speed oscillations. This failure may have been due to the poorer mechanical condition of the gate operating mechanism, and it is certain that the same cause contributed to a considerable degree in the apparent time lapses between pilot valve movement and gate response. Lags as high as from 8 to 10 sec. were noted.

In discussing the behavior of the governor when operating in conjunction with the automatic frequency controller, some attention will have to be paid to the latter device, since it forms an integral part of the apparatus. In fact, it is nothing more than an additional automatic adjustment to the governor, and acts entirely through that medium. As a general observation, it may be stated that the application of the automatic controller to the governor, while setting definitely the frequency base, is productive of a wider frequency band than exists when its influence is eliminated. Furthermore, the principle of its operation and the scheme of application seem to modify to a considerable extent the general effects of the normal governor adjustments. As an illustration of this point, No. 4 unit, operating without the frequency control, and with the W. W. P. system separated from Puget Sound, was subjected to adjustments of dashpot and speed droop which, under no load conditions, would have produced wide fluctuations in speed. Under these conditions, the frequency varied from 0.10 cycle below, to 0.16 cycle above the median speed, and the accompanying load changes were smoothly accomplished. Upon being returned to the automatic control, however, the amplitude of the oscillations was immediately increased to 0.4 cycle and wide swings in load were introduced which alternated with periods of comparative stability. That this behavior was attributable, in a large measure, to the influence of the frequency controller was evidenced by the fact that its removal from service was productive of more stable conditions.

With interconnected systems, the impulse period of the frequency controller was decreased from 2 to 1 sec. This alteration was followed by a series of long slow swings in load, which ranged as high as 5,000 kw. over periods varying from 2½ to 3½ min., and this in spite of the comparatively narrow frequency band which is characteristic of interconnected operation. Upon again separating the systems, the frequency band expanded to amplitudes as high as 0.4 cycle, with accompanying moderate load changes, but without the heavy, slow load shifts which were previously in evidence.

When the frequency controller was stepped up to 1-sec. impulses, it was done in the belief that the more frequent action might narrow the frequency band by an earlier recognition of departures from the base, and consequently, a more prompt application of corrective adjustment might be made. This objective was not attained, and, to make matters worse, the wide shifts in loading, above described, were introduced.

Turning to a general consideration of the mutual reaction of governor and controller, some rather interesting facts are brought to light. Evidence points to such divergence of activity as, in one case, the application of four or five controller impulses with a lapse

of 6 sec. before any correcting gate movement was produced, and, in another case, the inception of normal, corrective governor activity before any impulse from the controller was received. Such extremes depend of course upon the rate of speed change and the timing of the instantaneous speed position for controller sensitiveness, with respect to the regular impulse period. Moreover, the point of application of these impulses, at the synchronizing motor, may have a tendency to upset the normal mechanical compensation of any previously instituted governor action.

The fact that the present frequency controlling apparatus at Long Lake is a non-compensated adjustment, and that, even with its contemplated improvements it will remain so, marks it as a potential disturber of system frequencies. Furthermore, instead of applying its full correcting force immediately to the operating mechanism controls, it must back through the governor by way of the secondary compensation. No matter how capable a performer on the brasses may be, a labial impulse through the wrong end of a French horn will probably produce nothing more edifying than a Bronx cheer; the same effort, properly applied, will be rewarded with a clear, musical note.

In conclusion, the following broad suggestions are offered in the hope that some progress can be made through their careful consideration, even though it be by means of partial or complete refutation of the assumptions involved. First, with respect to future testing, it is believed that some scheme should be adopted which will permit isochronous recordings of the behavior of all units in a given plant, visually coordinated with integrated plant output and system frequency. Records of this character should be particularly valuable in the case of plants, such as Long Lake station, where absorption of system-load fluctuation is combined with nominal frequency control. Simultaneous and similar recorded charts of tie-line loadings, in all directions from physically intermediate plants, might be of considerable assistance in locating the foci of system disturbances as well as the major points of compensation.

Paradoxical as it may seem, probably the best governor characteristic for base load plant operation is relative insensitivity. If, as has been pointed out, all units which are assigned steady loads are insensitive to speed changes of small amplitude, no disturbances or interchange of load can originate at such points, provided, of course, that the governing mechanisms themselves are in proper mechanical condition to maintain a stable output until actuated by a speed change to which the governor head is sensitive, and that the regulating plants have sufficient sensitivity, activity and capacity to absorb all instantaneous peaks without too marked a departure from the base frequency. The regulating plants themselves should be equipped with highly sensitive and quick acting governors. Present indications point to the desirability of restricting frequency impulses to a single unit, with all others following closely on rapidly effective balancing impulse control.

In the case of interconnected systems, it is not only frequently impossible, but usually undesirable to have a single group of units on one of the component systems absorb the instantaneous load variations. Such an action would necessitate almost continual manual adjustment of the loads at the variable capacity plants on the non-regulating systems. Here, as before, the variable load plants could be equipped with highly sensitive governors upon which balancing impulses, quickly applied, would originate in tie line loading variations, in general conformity with current practice.

It is doubted that such an ideal can become a reality unless some method for the proper compensation and application of frequency control impulses be found. It may be that the not too distant future will witness the development of a device which will act continuously, on the basis of the first derivitive, or slope of the frequency curve, instead of being influenced, at predetermined intervals, simply by the positive or negative ordinates to the curve itself. In order to increase its effectiveness, moreover, it would appear desirable to make its point of application the pilot valve itself, or even an independent auxiliary piece of apparatus specially constructed for the purpose.

The writer closes with a renewed acknowledgment of his lack of pertinent data relative to the problem and admits that he has not even digested a small part of the information currently available. In extenuation, he must plead his short connection with the subject and the limitations of the time at his disposal.

# Electrical Equipment Committee*—Systems Engineering†

## Load and Frequency Control Studies

By M. L. BLAIR
Washington Water Power Co.

FROM 1937 to 1939, a number of changes have occurred on the interconnected system. It is now possible to operate eight of the major generating and transmission systems in the Pacific Northwest in parallel. Another of the interconnecting tie lines has been equipped with a tie line load controller and some changes have been made in the frequency control.

A great many tests have been made in an effort to determine the cause of such drastic and frequent changes in the tie line load. There are now at least five interconnecting points of importance. Each of these main tie lines are yielding similar problems, but it is believed that if the problem is solved for one it will be substantially solved for the rest.

In the tests made in the past year, a special meter designed and built for this work was used. The meter is a double photo-electric device which is accurate, very sensitive, and dead beat in action. Of the two electrical elements, one is a wattmeter and the other a frequency meter with both recording on the same ten inch chart. Two other pens are arranged to record on the same chart the mechanical movement of the governor and gates. A simultaneous record can be obtained of the frequency, the pilot valve movement, the gate movement, and the unit output on a high speed chart which travels from one half inch to twelve inches to the minute. By the use of such a meter, the relative time movements of a governor or the re-

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lation of a tie-line to frequency can be determined to a second. The first test with the photo-electric meter was made on the tie line between Montana Power Co. and Washington Water Power at the interconnecting point in northern Idaho.

In general, the tie-line load controllers and the frequency controller have performed creditably, and their operation at times is all that could be desired, but knowledge pertaining to large system interconnection is in its infancy and controllers are undoubtedly subject to a great deal of further development as the study of the problem progresses.

One test consisted of operating all the major systems inter-connected as one unit, and then separating each system at a time to determine what effect each might have on this particular interconnection. During each period, the three controllers were taken out and placed in operation to determine their response to each combination. No attempt will be made here to illustrate or to explain the result of the many combinations of systems and controllers that were observed during the test.

When all companies were operating in parallel using the Montana-WWP tie-line controller, the Puget Sound-WWP tie-line controller and the WWP frequency controller, average load held by the WWP-Puget Sound controller was excellent, but there are three spikes on the load charts widened the band from 10,000 to 17,000 kw.

The frequency, though a shade below 60 cycles, was quite good. The tie-line load controller, on the other hand, after maintaining a constant load for several minutes, dropped the input to WWP from 12,000 kw. to zero and increased to 14,000 kw. in 1 min. 20 sec. There is considerable question in the writer's mind as to the cause for such a movement.

The misoperation of the controller could not have been caused by a frequency change as many frequency changes greater than the minor ones involved had not previously caused any such action by this controller. It also hardly seems probable in view of the known speed of the controller and the governor mechanism, through which it operates, that it was unable to correct this tie-line change at a rate of speed equal to an assumed connected-load change when the period of decreasing load was more than a half minute.

It appears to the writer that the load was allowed to drift from about 7,500 to about 12,000 kw. before the controller came into play and the resulting correction overtravelled and was recorrected with an overtravel to 14,000 kw.

Hundreds of feet of high-speed charts were recorded during the tests. Close study has clearly indicated that the speed control must be improved, that tie line load controllers as at present known are not the final answer to the problem, and that there are other factors which may be the limits beyond which no improvement is possible.

An inspection of any of the high speed graphic records shows that the minute to minute swings are made up of two components. One component is the change in average power flow, which has a period of not less than 10 sec. and may have one of several minutes duration. This component is the resulting action of the connected load, governors, and controllers. The other component is an inherent characteristic of a synchronous a.c. system. This component first came to light in the tests of 1937, and except for the interest aroused, it was not considered as an important part of the problem of interconnected operation. This component is the synchronizing torque or power between units, plants, and systems, without which it would not be possible to operate synchronous units in parallel. The resulting combination of the two components causes a definite widening of the power swings on certain interconnections.

The first component it at present the chief problem. Unquestionably, speed control is a related problem.

A good example of what occurs when a system with relatively good control is interconnected with one of poorer control was found when a test was made on a small isolated system at the time of its original interconnection with a larger system. This test is used as an example because many of the factors which appear to complicate the problem of interconnected operation are not present in this example, and yet the characteristics revealed in this test are present in a major interconnection. The small system consisted of one turbo-alternator, some residential and commercial load, and a highly variable industrial load.

A test was made on the unit to determine the possible action of this unit when operating in parallel with a major power system. A record was taken of the unit output in kilowatts, the pilot valve movement, and the frequency when operating as a separate system. The speed was changing frequency and rapidly within a band of about one-half cycle with little change in unit output, and it was noticed during the test that when the average frequency became permanently displaced from 60 cycles, the correction was made manually by the operator. All minor load changes were converted into a speed change and not into a change in prime mover output.

A record of the load changes on the connecting tie-line to the larger system showed the frequency had become the same as the frequency of the larger system and all load changes on the smaller system were absorbed. This is an excellent example, not complicated by a multiplicity of units, types of load, or controllers, of what happens between two systems when one system has the better speed control.

Some of the questions are answered by practical considerations. The cost of replacing or rehabilitating the governors in the older plants would not, in most cases, be justified by sufficient improvement in the system speed if the major controlling plant were properly equipped. Assumptions based on tests and experience, to date, would indicate that one plant on each system should be the controlling plant and that plant should be equipped, considering present development, with hydraulic governors equal to the sensitivity and action of a modern governor. In theory, it appears that if a combination load and frequency controller actuated the gates of the unit by directly controlling the servo-motor, the ultimate in control of both speed and tie-lines would be obtained, but a controller that can accomplish this has not been developed as far as the writer knows.

In a partial study of the connected load and of operating practices, it has been found that few customers can cause a change in connected load of even as much as 10,000 kw. With tie line changes of amounts as great or greater than 10,000 kw. every few minutes, this change in system to system power flow must be charged to a change in prime mover output. The most severe change in the tie-line load arises from the transfer of power output from plant to plant by the system operators, the misoperation of governors, controllers, or a combination of the action of the two devices.

A good example of what can occur is given by the WWP frequency controller at Long Lake and the Wenatchee Line tie-line controller, operating Puget Sound's White River plant. Hunting between these two controllers can be started by making a fast change in output at the Chelan Plant, which is located at the interconnecting point.

The solution of such hunting between controlling plants is probably an improvement in the speed control from Long Lake and the possible addition to the White River controller of some sort of compensator or selective blocking of the present control. When the Portland area systems are operating

in parallel with WWP, Montana, and Seattle area systems, the frequency is considerably improved and with the improved frequency the Washington-Puget Sound tie-line-controller operation is more nearly correct.

Considerable testing and work towards improvement of the Wenatchee tie-line controller has been done and is planned for the future. A number of faulty operations have been eliminated by adjustment of the application of the controller signals to the governors, and other errors in the signal have been found and corrected in the carrier-current telemetering apparatus. At present, the signal received at White River does not indicate the exact load on the Wenatchee line at Chelan, but it is expected to have this error corrected soon. The quality and value of the signal received by the governor is only as good as the telemetering device, and it is realized that outside influences may well affect this signal and cause a misoperation of the governors.

Indications from the records are that the tie-line controllers perform quite well when the frequency is being held to a very narrow band and the load changes are not rapid. On a rapid change in power flow they apparently over-travel and widen what would be the normal width of the power swings from 50% to 100%. Even assuming a modern high-speed controller, operating through a sensitive governor mechanism, it is believed that until compensation is applied these controllers will overtravel. Partial compensation has been developed with additions to controllers of biased frequency control, selective blocking, and devices designed to block those signals from the governors, received when the frequency or the tie-line load is moving toward the scheduled speed or scheduled line load.

Operation of the Washington-Montana controller was discussed at some length in last year's paper and tests made this past year have partially confirmed those conclusions. This controller is similar to the Long Lake controller and governor mechanism.

From the many tests, it appears that the speed control of the Portland area systems is excellent. Unfortunately no extensive tests have as yet been made on the tie-line connecting this area to the remainder of the group. A standard chart on this tie shows to some extent the same type of hunting that exists on those ties so far tested. Reports from the Portland companies confirm the opinion that those systems are absorbing a great many of the load changes.

Washington Water Power, due to its geographical location in the approximate center of the interconnected system, has for several years been the frequency controlling system, but on studying the test charts, it is apparent that the instantaneous control of frequency is by the Portland and Seattle area systems with the usefulness of the Long Lake control limited to holding the frequency average at 60 cycles.

The writer feels that regardless of the sensitivity of the mechanical devices used, a frequency controller will still be necessary. Without elaborating, this is an opinion based on the experience of a large eastern interconnected system and the great midwest-southern interconnection, where the preponderance of the speed control has been by sensitive steam governors, and yet both interconnected systems have found it necessary to use frequency controllers.

By closely studying the record taken on each system, the frequency appears to have a fairly uniform beat peculiar to each system. The Montana frequency has an oscillating change in speed of about 2.6 times per min. with an average amplitude of about .17 cycle. WWP has this change at a rate of 2.7 per min., amplitude of 0.13 cycle. Puget Sound has 4.7 times per min., average amplitude of 0.06 cycle.

This paper has so far been devoted to an analysis of that component caused by load, governors, and controllers and has ignored the effect of the second component or synchronizing torque. Under certain conditions this is magnified in amplitude until it approaches the amplitude of some of the wider swings of the first component. Though the maximum hunting of the first component rarely ever synchronizes with the maximum swing of the synchronizing torque, many of the wider swings noticed on a standard 3-in. per hr. chart are the resultant of the two. The synchronizing power is an inherent characteristic of all synchronous equipment, and, for any given unit and with a given excitation, will have a natural period of oscillation. If the natural hunting period is a multiple of some other unit or units, then the amplitude of the oscillations on the lines connecting the units will increase in amplitude as the period of the units coincide.

Fast hunting, with a period on interconnecting tie-lines of 2 to 4 sec., was commended on by the writer in last year's paper as the probable visible sign of torsional stress between systems. However, there was no definite proof that this might not be the result of hydraulic and mechanical stresses. It was pointed out to the writer by C. E. Cannon certain tests, in conjunction with calculations of natural frequency and phase angle could be made to determine which of the two possibilities might be correct.

One of the units on WWP's system, which had a very definite beat, was measured and counted for the frequency per minute. This figure obtained by actual measurement agreed very closely with calculated results. The excitation of this unit was varied after the unit had been loaded to give the maximum amplitude to the oscillations, and it was found that this change in excitation definitely reduced the amplitude. Another proof that this oscillation is the synchronizing power and not caused by the hydraulic part of a unit, was the finding of the same characteristic oscillation when testing a steam unit. As far as the tie lines are concerned, it has been found that the hunting per minute will decrease on one interconnecting tie-line when another tie between the same two companies is opened.

The writer has no definite plan for a solution of the synchronizing power swings. They are of minor importance on many of the interconnections, but on those ties where they are becoming a factor in the control and transmission of power, they may be reduced in amplitude by changing certain plant outputs.

Each test that has been made suggests another, and the units, tie-lines, and controllers, can well all be tested for both their individual and coordinated action. As a plan for further testing, it is suggested that:

1. The frequency control of the speed controlling system should be improved.
2. That all tie-line controllers must operate through a very sensitive governor mechanism.
3. That improvement should be made in the compensation of tie-line controllers.
4. That a system controlling a tie-line must primarily respond to tie-line load changes and not to frequency.

## Discussion

By J. W. ROBINSON
Leeds & Northrup Co.

The authors are to be congratulated on their presentation. There are other large interconnections elsewhere in this country and while, to a great extent, the problems involved have been similar to those faced in the Northwest, in certain important respects this interconnection involves factors which are unique and therefore require close study. For instance, the general picture includes such phases as large load changes principally occurring toward the East, where the units are characterized by slow response to the resultant

speed change; the steadier loads are largely in the West, where the faster governors are located. In some instances the governing equipment itself responds rapidly but the effect is delayed or lost since no change in load on the units is noticeable; the primary speed regulation is handled by a plant which, based on the results of tests as given today, has an inherent response considerably delayed with respect to action taken by some other plants. This condition is reflected in the various tie-line loads, as would be expected.

I have one question for Mr. Blair concerning the charts shown. In one instance, pronounced exchange of load occurred between Long Lake and White River, while automatic controls at both points were in operation. The question is whether at that time the White River controller was on flat-tie-line control? This control can be based on tie-line load alone or, through the bias feature, on a combination of tie-line load and frequency. Long Lake, of course, operates on frequency conditions alone.

It is quite probable that if White River was on flat tie line operation, for tests or other reasons, since it could not under this method take frequency conditions into consideration, some of the load changes made would oppose the frequency. This would increase the burden on Long Lake and corrective action there would again upset the tie line load, which would cause further action at White River. Whether or not the load transfers were started by other causes, if this assumption is correct, the result as shown by the charts is quite logical. Had White River control been shifted to bias operation, the swapping of load between the stations might well have been reduced if not entirely eliminated.

## Discussion

By A. N. GEYER
Woodward Governor Co.

Having been favored with a prevue of these important papers, I have some impressions: Mr. Hill's findings on the governors investigated are quite usual in this general run of older governors—particularly as to unstable operation; it is also common to find improper dashpot adjustments, often thrown out where the use of a superposed frequency controller has led to the loosening up of governor action in the effort to get governors to respond with freedom—and freedom it is that results—freedom to move out almost unrestricted. This means overtravel and hunting.

Regarding the recommended insensitivity, this, although found effective on block-load units to prevent movements except in extreme departures in speed, may contribute to hunting difficulties when surges are once started. as by a line failure.

Consider such a governor with a wide dead-band, say ¼ cycle. Plainly, this unit may remain quiet under ordinary conditions, but any real system disturbance will set it moving, and because this movement will continue strongly until pilot and relay valves are reversed in direction, this makes a large preponderance one way and then the other, especially as compared with a case of good sensitivity where its narrow band is quickly traversed to check movement.

Such continued swings are well shown by some of Mr. Blair's last charts, which I deem of great importance in this study, because it is system disturbances that chiefly test the interconnection. One very timely chart records nicely a line failure and the resulting regularity of swings, and while these died out in time, the fact they did not die off quickly shows that something is too closely of the same natural period, hence may under slightly altered conditions actually add to each swing.

These conditions of fighting among power plants that happen to be on different systems often build up tie-line loading to the tripping point, but such is not to be expected of modern precision governors, for these can be depended upon to work nicely not only with, but even in spite of, the superposed frequency controller just reported to have been removed out of necessity to stop cases of hunting so graphically recorded. The successful governor, of course, has the proper compensation with a timing fitted to the swing, which latter starts very fast as we have seen in the serious disturbances shown, and thus calls for very fast governor movement, to which obviously the compensation must be properly timed, all raising serious question about how the discussed addition of this property may possibly be made to this type of controller having the delay in full seconds so consistently reported to these meetings.

# Electrical Equipment Committee—Meters, Services*

## Service Conductors

By C. S. ALGER
Puget Sound Power & Light Co.

THE introduction of cable assemblies designed to replace service entrance conduit and separate conductor service drops has, as might be expected, resulted in differences of opinion regarding the relative merits of the old and new materials.

It is the purpose of this discussion to cover the various aspects of service conductor practice as it exists today in the Northwest with reference to residential service. The statements contained herein and such conclusions as are reached are based on information obtained from meter committee members representing ten serving companies replying to a questionnaire.

Considering first, the service entrance conductors, it appears that approximately one third of the installations in the areas served are cable jobs. Practice in the various areas during 1938 varied from 95% cable to 100% conduit.

Cost data indicate that equivalent capacity can be obtained with S. E. cable for from 10 to 20% less than the expenditure for a similar conduit installation notwithstanding the fact that where cable is used extensively the cost of conduit jobs has probably decreased somewhat. However, three companies state that conduit is favored exclusively while a fourth indicates that conduit is preferred. Cable is favored in the remaining areas where its use does not conflict with local ordinances.

The replies of members in areas where conduit is used extensively indicate that this selection of material is influenced to a considerable degree by local ordinances. Six members reported such conditions where local codes prohibit or restrict the use of cable by special requirements, such as protection at points below 8 ft. from the ground, limiting to residential use, to certain building districts or to ex-

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isting structures. In some cases inspection authorities discourage but do not prohibit the use of cable.

Two members felt that entrance capacity can be increased more easily and cheaply where conduit is installed originally, and one member favored conduit as a safer installation.

On the other hand, in commenting on cable, it was pointed out that it is more adapted to following building contours and more readily installed, both of which contribute to lower first costs. In addition, it was indicated that cable is more suited to removal and re-installation, has a greater salvage value and is less conspicuous. One member observed that there is a material reduction in condensation in meter sockets where cable is used.

General opinion was that cable has not been used for a sufficient length of time to compare maintenance costs, although no maintenance on cable installations made to date was reported.

In discussing the various replies covering S. E. cable it should be pointed out that more capacity can be installed in cable than in conduit for equal cost, and that since the service entrance frequently becomes the bottle neck which prevents expansion of electrical use, any reasonable trend in materials leading to a more rapid increase in capacity should be encouraged by serving companies.

In those instances where local codes frown upon or prohibit the use of entrance cable it would seem that the experience of others with such installations should be made available to the authorities and, if possible, trial installations arranged for, so that those interested may have full information on which to judge the merits of such jobs. There has been nothing in experience to date which warrants more stringent restrictions.

Regarding the opinion that service entrance can be increased at less expense if the original installation is in conduit, this seems to presuppose that oversize conduit was originally installed or that larger conductors can be pulled in and the necessary permission to do so obtained. Otherwise the conduit can be replaced more cheaply with cable. If oversize conduit is installed originally, the differential in favor of cable will be larger and cable capacity adequate for future needs can probably be installed for the same cost.

In general, it appears that the trend is away from conduit, particularly on rewire jobs and "theft-proof" installations where ease of application, convenience and general adaptability are essential requirements.

As a means of more rapidly introducing cable jobs, at least one company specified the use of cable wherever possible on all entrance wiring jobs handled as a part of an appliance sale or as a convenience to the customer. This approach seemed to have considerable merit since it reached a large group of reliable contractors and, in addition, resulted in a less expensive job with benefits to both company and customer.

Although not strictly within the scope of this report, an inquiry was made regarding the required height of the meter above ground or floor level. This varied from 4 to 8 ft. with one company specifying not less than 7 or more than 8 ft. and another not less than 4 or more than 7 ft., with the apparent average running over 6 ft. One company requires the meter to be located at a height of 8 ft. if ungrounded, and 6 ft. if grounded, raising a question which may be worthy of further consideration. The location of meters at heights in excess of 6 ft. appears to defeat the purpose of outdoor metering to some extent, making it unnecessarily difficult to perform the usual meter operations.

In reply to a series of questions concerning service-drop cable, eight members reported some cable used. Of these, six had made experimental installations or had used cable in a few special cases. One of the two remaining members reported 50% of the services installed in 1938 as cable jobs, and the other reported 10%. While it is apparent that the use of S. D. cable is for the most part extremely limited, some data of general interest were obtained.

The cost of cable installations as compared to similar two or three-wire, separate-conductor services were variously reported as between 50% and slightly over 100% higher, with the company using the most cable reporting the smallest differential.

In commenting on cable for service drops, several members stated that it has the advantages of improved appearance, effectiveness under conditions where it would be difficult or unwise to run single conductors, such as on the narrow eaves of modern houses, probable lower maintenance and a limiting effect on current diversion when used in a continuous run to the meter, except in the case of those customers with simian proclivities.

On the other hand it was pointed out that open conductors give equivalent service at a considerably lower first cost with less waste in cases where poles are moved or replaced, less waste in the utilization of removed conductors, and, in some cases, customers prefer separate conductors to cable from an appearance standpoint.

Both members reporting an appreciable use of cable drops also stated that no extra charge is made for such installations, indicating that their companies had adopted cable notwithstanding the increased cost. One member reported that the few installations made, where cable was necessary to the type of building construction, no charge was made for the cable between the meter and point of attachment to the building. The remaining members who have used cable indicated that a charge was made to cover the increased cost.

There was some divergence of opinion in regard to the relative maintenance costs of cable and separate conductors ranging from lower to higher costs for cable. Since cable drops are comparatively new and limited in number it may be some time before definite conclusions can be reached. However, attention was called to the fact that the wire-mesh cable grip is to be preferred for this service as less likely to cause cable failure at the grip, particularly as compared to those of the wedge type. Short circuits occurring in cable may be difficult to locate and may require the disconnection of a number of services before the fault can be located. The sag in cables made up with soft drawn conductors may also become a problem.

In those areas where competition exists, it is the practice either to purchase the service outright at plant value or for the incoming utility to deliver to the outgoing utility's warehouse the equivalent in material of the service taken over. The former procedure appears to have the merit of including labor and does not involve short lengths of cable which may be difficult to utilize.

In conclusion, it is evident that in spite of the considerably higher cost of service-drop cable it has offsetting advantages for certain types of jobs and in addition furnishes the nearest possible approach to a completely tamper-proof installation. It is also apparent that the use of cable in special cases may result in requests for replacements of separate-conductor services elsewhere. Under such conditions, unless the utility is prepared to absorb the additional cost of the cable service, some plan must be adopted under which the customer will pay at least the excess and which provides for some equitable arrangement in regard to ownership and maintenance.

## Discussion

A. C. KELM: We started using service-entrance and service-drop cable to get away from current diversion. Service-entrance cable costs about twice as much as open wiring. Service-drop cable with the neutral wound around outside and covered with jute is about as cheap as open wiring. We received permission to bracket this to the side of the building and now run it from the pole to the meter. When this cable short circuits between the neutral and a hot wire, it burns off at one spot without blowing transformer fuses. This cable is soft drawn and will sag so it will have to be pulled up occasionally as part of regular maintenance. We do not extend these drops over 100 ft. and it sometimes means putting in an extra service pole. This strengthens the system in time of storm.

# Electrical Equipment Committee—Apparatus, Design*

## Reclosing Breakers Application Trends

By C. E. CANNON
Washington Water Power Co.

NINE systems, in answer to a questionnaire, reported 373 reclosing oil circuit breakers in service. In Table I, these are segregated according to the voltages of the circuits on which they are applied. It will be noted that 23 are in service at 44 kv. and above.

Table II shows how the units are distributed according to service applications, while Table III indicates how largely these are confined to unattended substations.

Distance to the nearest attendant from substations in which reclosing breakers are installed varies from a very short distance to over 10 mi. As a result of the use of reclosing equipment an average decrease of 30 min. in duration of interruptions to service was reported by a number of utilities.

One utility stated its policy was to install reclosing oil circuit breakers on all feeders at all major unattended substations. The remaining eight stated economic conditions made it necessary to give individual consideration to each installation, although a number of these companies had as their ultimate goal the installation of reclosing oil circuit breakers at all unattended substations.

Data on reclosing schedules are shown in Table IV. Most popular one approximates 15 sec. - 30 sec. - 60 sec. This corresponds closely with those recommended by manufacturers a number of years ago which usually were 15-30-60 or 15-30-75.

Considerations on which number of reclosures and reclosure intervals were based were widely varied. Two utilities based their choice on recommendations of the manufacturers of the breakers and reclosing relays. Four were guided by their own experience. The remaining three have been limited in their choice of reclosing schedules by the type of equipment available. In some instances the timing relay was the limiting factor, while in others the breaker interrupting capacity was not sufficient to permit immediate reclosure.

Five of the nine companies reported a trend in new installations (and on present installations where type of equipment would permit) toward fewer reclosures, generally two instead of three. One utility, however, considers that one reclosure at a 30-sec. interval is adequate. The remaining four reported no general trend, but some questioned the value of the third reclosure.

With reference to the reclosing interval, seven utilities reported a trend toward shorter intervals, particularly for the first reclosure, with rather indifferent ideas regarding subsequent intervals. Two utilities reported they were considering no change.

### Table I

| Voltage | No. of Reclosing Oil Circuit Breakers |
|---|---|
| Up to 5 kv. | 227 |
| 5-7.5 kv. | 10 |
| 7.5-15 kv. | 106 |
| 15-25 kv. | 7 |
| 44 kv. | 10 |
| 66 kv. | 10 |
| 110 kv. | 2 |
| 132 kv. | 1 |
| Total | 373 |

### Table II

| Type of Service | No. of Reclosing Oil Circuit Breakers |
|---|---|
| Radial Feeder | 345 |
| Tie Line | 17 |
| Loop Line | 4 |
| Duplicate Service | 7 |
| Total | 373 |

### Table III

| Type of Substation | No. of Reclosing Oil Circuit Breakers |
|---|---|
| Unattended | 344 |
| Attended | 21 |
| Part-time attended | 8 |
| Total | 373 |

### Table IV

(Figures indicate number of breakers reclosing in time shown in column at left)

| Time | Reclosure 1st | 2nd | 3rd |
|---|---|---|---|
| Instant | 34 | 2 | .. |
| 1 sec.- 5 sec. | 44 | 5 | .. |
| 6 sec.- 10 sec. | 7 | .. | .. |
| 11 sec.- 15 sec. | 158 | 43 | .. |
| 16 sec.- 20 sec. | 73 | 37 | 31 |
| 21 sec.- 25 sec. | 3 | 35 | 7 |
| 26 sec.- 30 sec. | 49 | 126 | 61 |
| 31 sec.- 35 sec. | .. | 60 | .. |
| 36 sec.- 40 sec. | .. | 1 | 1 |
| 41 sec.- 45 sec. | .. | 37 | 5 |
| 46 sec.- 50 sec. | .. | .. | .. |
| 51 sec.- 55 sec. | .. | .. | 2 |
| 56 sec.- 60 sec. | .. | 2 | 91 |
| 61 sec.- 75 sec. | .. | 4 | 78 |
| 76 sec.- 90 sec. | .. | .. | .. |
| 91 sec.-105 sec. | .. | .. | .. |
| 106 sec.-120 sec. | .. | .. | 14 |
| 121 sec.-135 sec. | .. | .. | .. |
| 136 sec.-150 sec. | .. | .. | 1 |
| No Reclosure or Not Reported | 5 | 21 | 82 |
| Total | 373 | 373 | 373 |

#### Operating Data

No unusual operating difficulties or maintenance problems were reported. Three utilities reported they had experienced some difficulty with maintenance of the timing relays. One recommended a complete overhauling of the relays annually, and another found that it had been necessary to keep the timing relays warm in winter.

Experience with the percentage of service restorations resulting from the use of reclosing breakers showed considerable variation. The following examples taken from the questionnaire show various experiences:

1. Of 422 operations, 376 or 89% were successful reclosures. These could not be segregated as to first, second or third reclosures.
2. For the past several years practically all automatic operations of circuit breakers equipped with reclosing equipment have been the result of sustained faults, and very little decrease in interruption time has been obtained by the use of reclosing equipment.
3. One oil circuit breaker operated 63 times with but five lockouts, for a 92% successful record.
4. Complete data on a group of reclosing breakers covered a total of 70 operations. Of these, 63% successfully restored service on the first reclosure, 14% on the second reclosure, 1% on the third, and 22 per cent locked out.
5. Reports on 72 automatic operations

* John Bankus, Portland General Electric Co., chairman; B. C. Electric Railway Co., C. W. Colvin; General Electric Co., J. F. Spease; Idaho Power Co., E. A. Woodhead; Northwestern Electric Co., A. O. Mangold; Pacific Power & Light Co., E. Forman; Puget Sound Power & Light Co., A. Shipek; Utah Power & Light Co., D. L. Brundige; The Washington Water Power Co., C. E. Cannon; West Coast Power Co., Henry Berk; Westinghouse Electric & Manufacturing Co., V. B. Wilfley.

show that 66 or 92% successfully restored service on either first, second or third reclosure.

Data regarding operation of the two 110 kv. units showed one of these is located in a tie line and recloses on correct voltage and synchronism after a fault. In 1938 it operated four times for a perfect record. The other is on a loop-transmission circuit and recloses on loss of potential on the line after an automatic operation. Since it was installed in 1936, it has operated 23 times. Service was restored 17 times on the first reclosure, once on the second reclosure, and there were 5 lockouts due to transmission line faults of a permanent nature.

One utility reported it used the integrated lockout feature on the timing relays on four high-voltage transmission line installations with a maximum of 16 operations before the switch locked out. Another utility reported using this feature but did not state to what extent.

All those reporting indicated they did not consider the use of automatic reclosing oil circuit breakers any more hazardous to life than the normal procedure with manually operated oil circuit breakers. None have found it necessary to change safety rules. Usual practice is to reclose one or more times at definite intervals without patroling the line and to tag the line out if the fault proves to be of a permanent nature. Two utilities attempt to reproduce their normal manual procedure in their automatic reclosing schedule, one using a single reclosure after 30 sec. and the other, three reclosures spaced 20 sec. apart.

Two utilities considered automatic reclosing as somewhat more hazardous to utility property than manual reclosure where it is possible for the operator to judge the severity of the fault to a certain extent. They stated that this factor had influenced their trend toward fewer reclosures and a shorter time interval between reclosures.

#### Conclusions

With but few exceptions, the application of reclosing oil circuit breakers by Northwest Utilities have been successful in reducing interruption time to feeders served from unattended substations.

Present reclosing schedules, particularly the second and third reclosures, are somewhat long. The trend, however, is toward shorter reclosing times. A less definite trend is observed toward the elimination of the third reclosure.

Nothing has been experienced to indicate that automatic reclosing is more hazardous than manual reclosing without patrols, provided the reclosing schedule is properly selected. The writer wishes to express his appreciation for the thoroughness with which members replied to the questionnaire.

## Discussion

J. HELLENTHAL: We have had a number of units in operation with satisfactory performance. On 4-kv. grounded neutral installations, the feeder generally burns clear and the breakers restore service. There are few lock-outs.

# Electrical Equipment Committee—Operation, Maintenance*

## Paint Tests

By R. H. JOHNSON
Puget Sound Power & Light Co.

THE slogan adopted by paint manufacturers, "Save the Sur face and You Save All," is far reaching in respect to electrical maintenance. It becomes more significant as the trend to more permanent construction grows and the need to cut maintenance costs increases.

Today, with the concentration of large power units using high-voltage switching equipment supported by exposed steel structures, the commonly used or misused article called paint becomes very important.

Following are results from paint tests conducted by member companies of the Association as they pertain to the protection of metal and, more particularly, structural-steel switching structures.

* J. S. McNair, The Washington Water Power Co., chairman; B. C. Electric Railway Co., B. deM. Mertens; The California Oregon Power Co., R. S. Daniels; Eastern Oregon Light & Power Co., O. D. Lanning; Grays Harbor Railway Co., W. S. Hill; The Montana Power Co., J. P. Medlin; Mountain States Power Co., G. McClellan; Northwestern Electric Co., Tom Perry; Pacific Power & Light Co., A. E. Frey; Portland General Electric Co., J. C. Henkle; Puget Sound Power & Light Co., R. H. Johnson; Utah Power & Light Co., H. H. Krueger; West Coast Power Co., Henry Berk.

#### British Columbia Electric Co.

For steel structures continually immersed in water, or subject to alternate exposure of air, a priming coat of paint made up in the following proportions has given very satisfactory results:

| | |
|---|---|
| Red Lead | 56% |
| Asbestine | 18% |
| Boiled Linseed Oil | 26% |

Specification for the above: Red lead powder containing not less than 95% pure $Pb_3O_4$ and not more than 5% of material other than oxides or carbonates of lead. The powder is finely ground, so that not less than 95% will wash through a 325-mesh sieve.

As a protection to the priming coat, a second coat of similar red-lead paint is applied, which acts as a complete seal; a final coat of asphalt paint is used. The asphalt paint should be of the best quality, and should not volatilize more than one-half of 1% at 300 deg. F., with a brittle point of not less than —6 deg. F.

All new outside switch structures of structural steel are given one shop coat of red-lead paint during manufacture; after erection, they receive one field coat of aluminum primer, and a finishing coat of best quality aluminum paint. Steel pipes and penstocks which have previously been coated with bitumastic paint are generally repainted with the same material; those which have been painted with oil paint are treated again with that type of paint, a finishing coat of black graphite paint being applied. This has good covering quality and is durable.

Transmission line towers which are not galvanized are painted with bitumastic paint; this has been found very satisfactory for five or six years.

Structural steel bridges are usually painted with red-lead primer, graphite paint, and finishing coat to suit conditions.

Considerable attention has been given to finding a paint suitable for steel trolley poles, with regard to durability, color, etc., and, after numerous tests over a period of years, it has been decided that a good red-lead primer, with a finishing coat of green Bakelite enamel, is most economical for this purpose. One of the most important points in connection with the painting of all structures is believed to be the preparation of surfaces. Particular attention is given to this feature.

#### Portland General Electric Co.

Tests are being made specifically for the evaluation of paints suitable for repainting exposed steel penstocks. The

tests are unusual in that the paint samples are applied by both brush and spray over the surfaces of steel plates which are both rusted and wet with water, in order to simulate a sweating penstock exterior, coated while in service.

Three distinct test methods are being used:

(a) Exposure of painted plates on an accelerated weathering machine, in which the plates rotate about a strong ultra-violet lamp and dip into a salt bath at 48-min. intervals.

(b) Exposure of painted plates to the elements by attaching them to Link-Belt travelling screens, which screen the trash from Willamette River water used at our Station "L" steam plant.

(c) Laboratory determination of the electrical resistivity of the various types of coatings when applied to wet plates and dry plates.

These tests have not been under way for a sufficient period of time to destroy the best of coatings. Hence only general information may be reported:

In the accelerated weathering machine, volatile vehicle paints such as ordinary aluminum paint, chlorinated rubber paints, etc., early failure was evident; while oxidizing-oil vehicle and coal-tar paints showed much greater stamina.

In the river water exposure tests, volatile vehicle paints are making fair showings, oxidizing-oil vehicle paints tend to soften and blister, and coal-tar paints show the best protection.

In the laboratory determinations of electrical resistance of the coatings, volatile-vehicle paints have negligible dielectric strength, oil-vehicle paints range from fair to good, and coal-tar paints range from good to excellent.

Another experience is deserving of note. We use a spray pond of fresh water for a circulating system in cooking the steam in turbine condensers. Two intake screens caused us some trouble through rapid deterioration and rusting. We renewed these screens two years ago, in January, and at that time used heavy, galvanized-iron-strand wire-cloth about ½-in. mesh, and cleaned the surface of the new galvanized iron thoroughly with muriatic acid. One-half of the screens were covered with rust eater and the other half with rust kill. Two years later, on drawing two of these up for inspection, we found them in very good condition. Those with the rust kill showed rust spots where the galvanized-iron mesh crossed, and on scraping this surface, the protection peeled off leaving the bare wire, which was slightly rusted, although it had not rusted very much of the metal itself. On scraping the rust eater we found it to be

## Table I — Puget Sound Power & Light Co. Paint Tests

| Sample No. | Paint Manufacturer | Primer Coats | Primer Material | Finish Coats | Finish Material | Percent Condition After Exposure at Richmond Beach — 1 yr. | 2 yr. | 3 yr. | 4 yr. | 5 yr. | 6 yr. | 7 yr. | 8 yr. | 9 yr. | 10 yr. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Fuller | 1 | Red Lead | 1 | Aluminum | 70 | 70 | 70 | 70 | 70 | 70 | 60 | 50 | 50 | 35 |
| 2A | Fuller | 1 | Red Lead | 1 | Aluminum | 70 | 60 | 60 | 60 | 50 | 50 | 50 | 50 | 50 | 25 |
| 3 | Sherwin-Williams | 1 | Sher. Will. | 1 | Aluminum | 30 | 30 | 20 | 20 | 10 | 0 | 0 | 0 | 0 | 0 |
| 4A | Sherwin-Williams | 1 | Sher. Will. | 1 | Aluminum | 25 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | Solastic | 1 | Redlastic | 1 | Aluminum | 75 | 75 | 70 | 70 | 70 | 70 | 60 | 50 | 50 | 25 |
| 6A | Solastic | 1 | Redlastic | 1 | Aluminum | 75 | 75 | 70 | 70 | 70 | 70 | 60 | 50 | 50 | 30 |
| 7 | Detroit-Graphite | 1 | No. 322 | 1 | Silvercool-Al. | 75 | 75 | 50 | 50 | 50 | 40 | 20 | 0 | 0 | 0 |
| 8A | Detroit-Graphite | 1 | No. 322 | 1 | Silvercool-Al. | 70 | 70 | 50 | 50 | 50 | 40 | 40 | 30 | 30 | 20 |
| 9 | Solastic | 1 | Red Lead | 1 | Sol. Steel Gray | 90 | 90 | 85 | 80 | 75 | 75 | 70 | 70 | 60 | 50 |
| 10A | Solastic | 1 | Red Lead | 1 | Sol. Steel Gray | 90 | 90 | 80 | 75 | 75 | 70 | 60 | 50 | 50 | 20 |
| 11 | Solastic | 1 | Steelastic | 1 | Steelastic | 75 | 75 | 50 | 40 | 40 | 35 | 30 | 30 | 30 | 20 |
| 12A | Solastic | 1 | Steelastic | 1 | Steelastic | 75 | 75 | 60 | 50 | 50 | 45 | 40 | 40 | 40 | 20 |
| 13 | Dutch Boy Brand | 1 | Red Lead | 1 | Red Lead | 100 | 95 | 85 | 85 | 80 | 80 | 75 | 75 | 75 | 70 |
| 14 | Dutch Boy Brand | 1 | Red Lead | 1 | Red Lead | 120 | 95 | 60 | 60 | 50 | 50 | 40 | 40 | 40 | 20 |
| 17 | Solastic | 1 | Redlastic | 1 | Redlastic | 85 | 85 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| 18A | Solastic | 1 | Redlastic | 1 | Redlastic | 85 | 85 | 80 | 80 | 80 | 80 | 70 | 70 | 70 | 70 |
| 19 | G. E. Co. | 1 | Red Lead | 1 | No. 728 Dark Lead | 90 | 90 | 80 | 80 | 80 | 70 | 50 | 40 | 25 | 10 |
| 20 | Wemco | 1 | Red Lead | 1 | Dark Lead | 90 | 90 | 80 | 80 | 80 | 70 | 50 | 40 | 25 | 25 |
| 21 | Solastic | 1 | Red Lead | 1 | Dark Lead | 90 | 90 | 80 | 80 | 70 | 70 | 40 | 30 | 10 | 10 |
| 22 | Sherwin-Williams | 1 | Kromic | 1 | Kromic Primer | 90 | 90 | 85 | 80 | 70 | 50 | 20 | 0 | 0 | 0 |
| 23 | Fuller | 1 | for. A-C42-LCP | | | 90 | 80 | 80 | 80 | 65 | 50 | 40 | 30 | | |
| 24 | Fuller | 1 | for. S-3664 | | | 100 | 95 | 85 | 75 | 60 | 50 | 50 | 30 | | |
| 25 | Fuller | 1 | Red Lead | 1 | Fullalumina | 90 | 90 | 90 | 85 | 70 | 60 | 60 | 60 | | |
| 26 | Fuller | 1 | Red Lead | | | 80 | 80 | 75 | 60 | 45 | 30 | 20 | 0 | | |
| 27 | Fuller | 1 | Red Lead | 2 | Silvercool | 100 | 95 | 90 | 85 | 70 | 60 | 60 | 60 | | |
| 28 | Fuller | 1 | Red Oxide | | | 90 | 20 | 10 | 0 | 0 | 0 | 0 | 0 | | |
| 29 | Sherwin-Williams | 1 | Red Oxide | 1 | Aluminum | 95 | 70 | 65 | 60 | 45 | 35 | 30 | 20 | | |
| 30 | Sherwin-Williams | 1 | Kromic | | | 90 | 85 | 70 | 60 | 30 | 15 | 10 | 0 | | |
| 31 | Sherwin-Williams | 1 | Kromic | 1 | Aluminum | 85 | 60 | 50 | 50 | 40 | 35 | 30 | 20 | | |
| 36 | Sands Paint Co. | 1 | Red Lead | 1 | Aluminum | 95 | 95 | 90 | 70 | 60 | 60 | 50 | 40 | | |
| 37A | Sands Paint Co. | 1 | Red Lead | 2 | Aluminum | 100 | 95 | 95 | 80 | 70 | 70 | 60 | 50 | | |
| 38 | Sands Paint Co. | 1 | Black Rust Proof | 1 | Aluminum | 70 | 50 | 30 | 10 | 0 | 0 | 0 | 0 | | |
| 39A | Sands Paint Co. | 1 | Black Rust Proof | 2 | Aluminum | 100 | 95 | 90 | 60 | 50 | 20 | 20 | 15 | | |
| 40 | Sands Paint Co. | 1 | Red Lead | 1 | Transf. Grey | 90 | 60 | 40 | 10 | 0 | 0 | 0 | 0 | | |
| 41A | Sands Paint Co. | 1 | Red Lead | 2 | Trans. Grey | 100 | 100 | 100 | 50 | 30 | 20 | 10 | 0 | | |
| 42 | Sands Paint Co. | 1 | Transf. Gray | | | 50 | 50 | 0 | 0 | 0 | 0 | 0 | | | |
| 43A | Sands Paint Co. | 1 | Transf. Gray | 1 | Transf. Grey | 70 | 40 | 0 | 0 | 0 | 0 | 0 | | | |
| 44 | Sands Paint Co. | 1 | Red Lead | 1 | Varnish | 100 | 95 | 90 | 80 | 70 | 30 | 0 | | | |
| 45A | Sands Paint Co. | 1 | Red Lead | 2 | Varnish | 100 | 95 | 90 | 70 | 50 | 40 | 10 | | | |
| 46 | Am. Asph. Paint Co. | 1 | Red Lead | 1 | Valduro Alum. | 90 | 40 | 20 | 5 | 0 | 0 | 0 | | | |
| 47A | Am. Asph. Paint Co. | 1 | Red Lead | 2 | Valduro Alum. | 100 | 90 | 80 | 80 | 80 | 80 | 70 | | | |
| 48 | | 1 | Elastikote | | | 30 | 10 | 5 | 0 | 0 | 0 | 0 | | | |
| 49A | | 1 | Elastikote | 1 | Elastikote | 70 | 60 | 50 | 30 | 20 | 10 | 0 | | | |
| 50A | | 1 | Elastikote | 2 | Elastikote | 95 | 80 | 60 | 50 | 40 | 30 | 0 | | | |
| 62 | Socony | 1 | No. 151 Blue Lead | 1 | 11-A-3 Al | 90 | 85 | 80 | | | | | | | |
| 63 | Socony | 1 | No. 2242 QD Marine | 1 | 11-A-3 Al | 90 | 85 | 80 | | | | | | | |
| 64 | Socony | 1 | No. 1101A Red Lead and Oxide | 1 | 11-A-3 Al | 90 | 85 | 80 | | | | | | | |
| 65 | Socony | 2 | No. 151 Blue Lead | 2 | 11-A-3 Al | 90 | 85 | 80 | | | | | | | |
| 66 | Socony | 2 | No. 2242 QD Marine | 2 | 11-A-3 Al | 95 | 95 | 90 | | | | | | | |
| 67 | Socony | 2 | No. 1101A Red Lead and Oxide | 2 | 11-A-3 Al | 95 | 95 | 90 | | | | | | | |
| 68 | Socony | 1 | No. 151 Blue Lead | | | 20 | 10 | 0 | | | | | | | |
| 69 | Socony | 1 | No. 2242 QD Marine | | | 50 | 50 | 40 | | | | | | | |
| 70 | Socony | 1 | No. 1101A Red Lead and Oxide | 1 | No. 10 Liq. Cu. | 85 | 85 | 85 | | | | | | | |
| 71 | Nat'l Copper Pt. | 1 | No. 11 Neutralizing | 1 | No. 20 Flame Proof | 70 | 70 | 70 | | | | | | | |
| 72 | Nat'l Copper Pt. | 1 | No. 11 Neutralizing | 1 | Wemco retouch | 0 | 0 | 0 | | | | | | | |
| 73 | Dupont | 1 | Dukromic Metal | 1 | R. P. 835-12 | 90 | 85 | 75 | | | | | | | |
| 74 | Dupont | 1 | Dukromic Metal | | Mach. Finish | 90 | 85 | 85 | | | | | | | |
| 75 | Dup. Primer Fuller Fin. | 1 | Dukromic Metal | 1 | No. 4559 Blue Ld. | 80 | 70 | 70 | | | | | | | |

Samples 1 to 22 installed on November 27, 1929, 2x2x¼-in. angle iron, upright in concrete, open side facing West.
Samples 23 and 24 installed on April 27, 1931, on 2x2x¼-in. angle iron.
Samples 25 to 31 installed in August, 1931 on No. 14-gage sheet-iron in 7-in. strips.
Samples 36 to 50 installed June 25, 1932 on 2x2x¼-in. angle iron supported in the column of outdoor steel structure.
Samples 62 to 75 installed July 10, 1936. Applied to sheetmetal.
Samples with "A" following numbers, cleaned before painted ,but had greater exposure.
Outside faces of angles facing East, in general, are in much better condition, as they were more protected.

in practically perfect condition. There were no rust spots whatever and the material in the rust eater apparently had worked its way into the metal and protected it from corrosion. These screens have been in water 24 hours a day since January 1937. Rust eater costs us about $5.90 per gal. in small lots, rust kill costs $4.07 per gal. Rust kill is a thin material which spreads a great deal more than the rust eater but will take 48 hr. to dry, whereas the rust eater will dry almost immediately.

In using rust kill on steel cases of our distribution transformers, we have thoroughly cleaned and rubbed off the rust and scale, then made an application of rust kill, permitting it to dry for 48 hr. or longer. We then have covered the rust kill with a good aluminum paint of asphalt base and found that we have given the steel very good protection.

**Puget Sound Power & Light**

Tests during the past 10 years, with exposure varying from 3 to 10 years, have been made to determine the combination that will give longest life as a protection coating. Table I indicates results.

Condition after exposure was determined by visual inspection of several observers each year over the periods of the test and are shown in per cent. The condition of the samples was based on color as well as the protective quality. Tests were carried on at a substation site north of Seattle on Puget Sound, where the samples were subjected to salt spray, fog and winds during the winter and sun rays in the summer. The samples were applied to angle iron in some cases, sheet metal in others. The metal used for the samples was new stock as it came from the mill and not specially prepared, except, in some cases, wire brushed.

Surfaces of the samples, in some instances, remained moist the greater part of the time, either through sweating or condensation or being shaded from sun rays, and in every case the rust broke through this surface of the paint more rapidly than through the surface that was dry part of the time.

On analyzing the various combinations of primers and finish coats, it becomes evident that the primer is most important to the protection of the surface; that the finish coat gives the desired color, protects the primer from abrasion and oxidation.

Analyzing the data, it is evident that by selecting the priming coat most suitable for the application and two finish coats of the desired color, the protective coating should have 10 years of life in extreme exposures and 12 to 15 years under ordinary conditions, with the reservation that the metal is properly prepared by eliminating all shop scale, rust, etc. One more important point should be stressed: that protection should be provided at the base of steel columns where they bolt to the concrete footings, and on the concrete surface where the members join. Moisture collects at these locations, and they normally remain moist from year to year. Special care should be exercised to seal the voids so that moisture will not permeate to hidden surfaces. Good paint, improperly applied, does not give any better results than poor paint, properly applied.

## Discussion

J. HELLENTHAL: For the Puget Sound Power & Light tests, started ten years ago, we mixed red lead and raw linseed oil. Navy and highway specifications call for raw oil, and this mixture seems to be the best primer. Observations now, after 10 years, show good results. The new compounds look good but there has not been enough experience with them to indicate what the results will be.

A. VILSTRUP: We use boiled oil only in cases of submerged metal.

A. SHIPEK: A thin coat, properly applied, will give better results than the old method of applying a primer thick with a brush. That method permits the outside to harden while the inside remains plastic. National Lead Co. has a specification under which a coat of primer is applied by spray so thin that it is almost transparent.

S. C. LINDSAY: Much time and money and expensive material has been wasted by the improper application of paint of all kinds. The secret is in properly cleaning the surface and in proper application. Application by spray is better than by brush, but you can get a bad spray job if you do not properly clean and prepare the surface.

# Removing Scale in Cooling-Water Pipes

By C. D. RANEY
Washington Water Power Co.

THE interior surfaces of pipes used for circulating cooling water within oil-insulated transformers, machine bearings, refrigeration systems, oil-sump tanks and the inside surfaces of water jackets, etc., are subject to incrustation from dissolved minerals and suspended matter in the cooling water. This deposit may be in the form of mechanically entrained impurities, such as silt, sand, or organic matter, or it may be the result of precipitation of minerals held in solution.

In the Northwest, these deposits are largely made up of carbonates of calcium and magnesium with compounds of silicon, aluminum and iron present in much smaller quantities. There is usually some organic matter present as well, especially when the supply is taken from open reservoirs or streams. Presence of these coatings reduces the efficiency of heat transfer in two ways: (1) The incrustation reduces cross-sectional area of the pipe so that less water is passed; (2) the resistance to the transfer of heat to the water is increased by the lengthening of the path along which the heat must pass and by the higher heat-resistance of this path. Good authorities estimate that 1/8 in. of scale will decrease the efficiency of heat transmission by approximately 20%.

Scale already formed in cooling water coils may be removed by mechanical or chemical treatment, or by a combination of these.

The chemical method of scale removal by dissolving the incrustations with an acid solution is perhaps the most rapid, efficient, and least expensive of all methods in general use. In order to know what solvents to use, it is first necessary to know the chemical composition of the scale to be removed. Any reliable chemist can make this analysis for a nominal fee.

Carbonates of calcium and magnesium are almost insoluble in pure water but are readily dissolved in water containing carbon dioxide, forming unstable acid carbonates. Natural water as found in springs and streams contains more or less carbon dioxide absorbed from the air and from decaying organic matter. This water passing over limestone ($CaCO_3$) and Dolomite ($CaCO_3.MgCO_3$) rocks reacts with the mineral to form the soluble but unstable acid carbonates. When solutions containing the acid carbonates are heated the normal carbonate is precipitated as a hard flint-like scale and the carbon dioxide passes off as a gas. Practically all of the carbonates in a given quantity of water have been precipitated by the time the temperature has reached 280 deg. F.

To remove the scale it is necessary to change it to a compound soluble in water. This we can do by treating it with an acid, such as HCl, which reacts with the insoluble carbonate to form a chloride which is soluble in water. The reaction of the acid with the carbonate also results in the rapid liberation of carbon dioxide gas.

Other scale forming minerals such as the oxides of iron and aluminum are deposited in much smaller quantities, in the order of 10% or less of the total scale formed. The action of the solvent on the carbonates usually dissolves sufficient material so that the iron and aluminum compounds are loosened and flushed out as granular matter in the form of silt. Silica is another constituent of scale but it is usually not necessary to treat the water for it as the quantity deposited is usually small. However, it may be necessary to add another solvent to break down the coating of silica. A solution of hydrofluoric acid will do this.

At the 29th Avenue substation of Washington Water Power Co. are several 2,200-kw. 3-phase, 60/2.2-kv water-cooled transformers which have been in continuous service for 30 years or more. For several years temperature of these transformers has become excessive during peak periods in December. Tests of water flow through the 1½-in. brass cooling coils showed that flow was reduced by as much as 66% below nominal. Blowing out the coils with compressed air did not appreciably alter the high temperatures. Mechanical cleaning, previously tried, had been found expensive and unsatisfactory and required a longer shutdown that operating conditions would permit. A scale sample was obtained by opening the cooling water system and chipping out a few pieces of scale from the end of the coil. Scale at this point was about ⅛ in. thick. Analysis of the scale, obtained from a local chemist, was submitted to a manufacturer of cleaning solvents who recommended a suitable acid solvent. This, it was claimed, would dissolve the scale and permit its removal within the limited time which operating conditions would permit.

Some experimental work was first done on one of the coils to develop methods and equipment for cleaning them successfully. Several coils were cleaned, and a typical job goes about as follows.

Previous to a pre-arranged shutdown a motor-driven, 1¼-in. centrifugal pump with a capacity of 50-gal. per min. at 100 lb. per sq. in. was set up near the transformer. A 50-gal. steel drum, set on end with the top head removed. and an open, ¼-in. steel tank, 4x4x3 ft., were set up on the floor of the transformer stall convenient to the pumping unit. Suction side of the pump was connected by a 2-in. iron pipe to the drum through a valve and a nipple welded into the side of the drum near the bottom.

Temperature of the station cooling water going into and discharging from the coil and the transformer oil temperature were measured with glass-stem thermometers, and the flow in gallons per minute was determined by a water meter connected to the discharge side of the coil. This was checked by catching and measuring the discharge. The station cooling-water supply-line valve was closed and the line disconnected from the coil. The inside of the scale-coated coil-end was then calipered and compared with that of the discharge end of the coil. There was no appreciable difference in the diameters.

The discharge side of the pump was then connected by 1¼-in. pipe to the intake end of the cooling coil. A tee and two valves were provided in this line as close to the end of the coil as possible and connected so that one valve shut off the discharge from the pump and the other, connected to the side outlet of the tee, provided a means of draining the coil. The discharge end of the coil was connected by a 1¼-in. pipe, discharging into the top of the 50-gal. drum.

The drum was then filled with water and the pump started. Water was added as required to keep the pump from drawing air until the coil had been filled and the discharge line was returning a steady stream of water to the drum. This pump developed about 25 lb. per sq. in. more than that registered on a gage at the coil inlet by the station cooling water supply under normal operating conditions. As a result of the circulation at increased pressure, a great quantity of black, greasy, flocculent material was flushed out. This lightweight substance was evidently carbon and dust from the air which had settled into the open cooling pond in the substation yard.

After a 5-min. run, the pump was shut down and the drum and piping drained to remove this sediment. The drum was again filled with clean water and the pump started. When the flow was uniform, valves on the discharge and intake were closed to trap the water in the coil and pump again shut down. The valve on the drain nipple at the intake was then opened and the water allowed to drain out of the coil. It was also necessary to open the valve on the discharge end of the coil to break the air lock. The quantity of water drained from the coil was recovered for comparison with that which the coil would hold when clean, in order to check the quantity of scale removed.

The drain valve was then closed and all other valves opened and the pump started, water being added to the drum as required until a uniform flow was delivered as before. A bronze fly screen basket was then hung over the end of the discharge pipe to collect as many of the scale particles as possible to prevent their recirculating and possibly plugging the circulating system. A sheet-iron hood with a discharge lip in one side was then set over the open end of the drum to direct the overflowing froth, generated by the action of the solvent on the scale, into the large square tank below.

Two gallons of solvent were next added to the drum. In about 60 sec. the discharge water turned milky white. At the end of 6 min. 2 gal. more were added. Within 60 sec. the discharge began to foam and pulsate with a muffled, water-hammer noise from the transformer as the solvent reacting with the scale generated large quantities of gas. Pressure at the pump discharge gage was 80 lb. Water and solvent (about one to two) were added as required to keep the liquid above the pipe from the drum to the pump and at a rate sufficient to keep the discharge flowing steadily. The viscous, sticky mass of foam welled up in the drum and the surplus overflowed down the lip of the hood into the square tank. The liquid in the foam gradually settled and was drawn off at the bottom through a valve and returned to the drum for further circulation. Five gallons of foam settled down to approximately 2 qt. of liquid in about 4 hr. Settling can be accelerated by agitating.

Pressure at the pump gradually increased from 80 to 115 lb.. At the end of 5 hr. continuous operation, 69 gal. of solvent had been used. The foaming then suddenly subsided and a solid stream of liquid began to be discharged. Further addition of solvent failed to produce more foam. The pump was allowed to run for 10 min. longer and then shut down. The pump piping was disconnected and the coil flushed out into the drain with station cooling water for 5 min. The drum and piping were drained and cleaned and reconnected as before. A neutralizing solution was then made up by adding approximately 25 lb. of neutralizing salt, (probably KOH or NaOH) furnished with the solvent, to the drum full of water. Neutralizing solution was circulated through the system for 10 min. to neutralize any residual acid, then discarded. Pump, piping, tanks, drums, etc., were cleaned, dismantled, and removed.

The coil was again filled with water and the volume required to fill it determined as before. The internal diameter of the clean coil pipe was again calipered. The station cooling water supply was then reconnected and temperature readings of feed and discharge water and oil temperature taken with the feed water valve wide open. Flow was also noted.

## Table I — Heat Transfer Data

| Column Conditions | (1) Valve open. Before cleaning. | (2) Valve open. After cleaning. | (3) Column (2) minus Column (1) | (4) Valve partly closed. After cleaning. | (5) Column (4) minus Column (1) | (6) Column (4) minus Column (2) | (7) Valve partly closed. After cleaning. | (8) Column (4) minus Column (7) |
|---|---|---|---|---|---|---|---|---|
| Date Taken | 3/14/39 | 3/24/39 | | 3/24/39 | | | 3/14/39 | |
| Water Temp., entering coil (deg. F)..... | 60.8 | 71.6 | +10.8 | 72.5 | +11.7 | +0.9 | 69.8 | +2.7 |
| Water Temp., leaving coil (deg. F)..... | 76.1 | 83.3 | +7.2 | 96.8 | +20.7 | +13.5 | 86.5 | +10.3 |
| Temperature Difference (deg. F)..... | 15.3 | 11.7 | −3.6 | 24.3 | +9.0 | +12.6 | 16.7 | +7.6 |
| Flow (lb. per min.)..... | 100.0 | 316.5 | +216.5 | 100.0 | 0 | −216.5 | 100.0 | 0 |
| Heat Removed (B.t.u. per gal.)..... | 127 | 97.4 | −30 | 202 | +75 | +104.6 | 138 | +64 |
| Heat Removed (B.t.u. per min.)..... | 1529 | 3703 | +2174 | 2428 | +899 | −1275 | 1669 | +759 |
| Transformer Oil Temp. (deg. F)..... | 84.2 | 96.8 | +12.6 | 97.7 | +13.5 | +0.8 | 89.6 | +8.1 |
| Inlet Water Pressure (lb. per sq. in.).. | 84 | 82.5 | −1.5 | 82.5 | −1.5 | 0 | 82.5 | 0 |
| Outside Air Temp. (deg. F)..... | 31 | 52 | +21 | 50.9 | +19.9 | −1.1 | 50 | +0.9 |

Flow was then throttled down to the same value as that before the coil was cleaned, and another set of temperature readings were taken. Flow was left at this value for 24 hr., then a third set of temperature readings was taken. A fourth set was taken several days later.

As the primary purpose of the cooling coil is to remove heat from the oil in the transformer, it is of interest to compare the quantities of heat transferred before and after removing scale. Accordingly the data observed while cleaning the coils in No. 1 transformer, and the calculated results obtained therefrom, have been tabulated in Table I.

In Table I is shown the data relative to the changes in water, oil and air temperatures, water flow and the calculated amounts of heat transferred from the oil to the water before and after cleaning; other conditions remaining approximately the same.

It will be noted that water temperature entering the coil varied from 68 deg. F. observed before cleaning the coil, to 71.6 deg. F. observed after cleaning. This change arises from the fact the transformer was allowed to remain under normal load for several days after cleaning before checking the water and oil temperatures for comparison. During this period the outside air temperature changed from 31 to 52 def. F. As the cooling water spray system discharges into an open outdoor pond, a change in outdoor temperature materially affects the cooling of the water.

It will next be noticed that although the temperature of water entering the coil after cleaning was 10.8 deg. higher than before cleaning, the temperature rise in the clean coil was 3.6 deg. less than in the uncleaned coil. However, an increase in flow of 26 gal. per min. in the cleaned coil was achieved. The heat removed by the cooling water was increased from 1529 to 3703 B.t.u. per min., an increase in heat dissipation to more than twice that accomplished by the uncleaned coil. Since more water is passed per minute, the heat removed per gal. is some 30 B.t.u. less.

Column 5 compares results when the cooling water was throttled down to the same volume as that passing through the coil before it was cleaned.

Column 6 compares two sets of data both taken after cleaning. It will be noted that with reduced flow the temperature of the discharge water increased from 83.3 to 96.8 deg. F., which of course raises the temperature difference before and after cleaning from 11.7 with normal pressure on the coil to 24.3 deg. F. with pressure reduced to give the same flow as before cleaning. The heat removed per gallon of water, however, was increased from 97 to 202 B.t.u., and the total heat removed per minute was decreased from 3703 to 2428.

Column 8 compares temperatures and heat changes taking place after the coil was cleared, under different conditions of load on the transformer, with the flow of water the same in each case.

In Table II are listed various items of general interest, including an analysis of the scale as found in the transformers at the 29th Avenue substation. The calculated amount of scale removed is only approximate and is the average obtained from three different methods of arriving at this figure. (It was not deemed advisable, on account of the additional expense and lack of time, to remove the coils and weigh them before and after cleaning.) The methods:

1. The length of the coil was obtained as nearly as possible from the manufacturer's drawing. Scale thickness at inlet of the coil was measured and the average, assumed to be the same throughout the coil, was used to calculate volume.

2. From the information furnished by the manufacturer of the solvent, the approximate quantity of scale dissolved per gallon of solvent used was determined. Knowing the total amount of solvent used the total weight of the scale removed was readily calculated.

3. Another check was made by filling the coil with water before and after cleaning and computing the difference in volumes.

Some of the main points to be observed in carrying out a successful cleaning job as outlined above are as follows:

1. Provide a pump of proper capacity, capable of operating under the head necessary to overcome the pressure of the gas generated by the action of the solvent on the scale.

2. Do not add solvent too rapidly at the beginning of the cleaning as there is danger of pieces of scale loosening and plugging constricted sections of a badly scaled coil.

3. Use only new fittings and valves as the cleaning solvent soon causes leaks in old fittings.

4. Have sufficient tank capacity to take care of the foam generated. Size depends directly upon concentration of solvent used and the velocity of its circulation.

5. Add solvent and water at a rate sufficient to produce a constant steady stream of foam and maintain the liquid level in the suction drum above the pump intake level at all times when the pump is running. The proportion of 2 gal. of water to 1 gal. of solvent added about every five minutes was found to be about right for transformers of around 2,000 kw.

Water-cooled transformers in the Spokane River plants and Post St., Erie St., and East Side substations in Spokane, have been in service from 15 to 35 years. From time to time the coils on

## Table II

Solvent required to clean coil—69 gal.

Average quantity of scale dissolved per gal. of solvent (approximate)—4½ lb.

Concentration of acid in solution before use (approx.)—33%.

Concentration of acid in solution after cleaning—.31%.

Inside diameter of coil pipe—1½ in. Length—544 ft. Material—brass.

Average thickness of scale as measured at ends of coil—⅛ in.

Calculated quantity of scale removed (average of three methods)—320 lb.

Liquid contents of 5 gal. of foam discharged from coil while being cleaned (average)—4 pints.

Time required to clean coils (actual cleaning time only. No time for assembling or dismantling equipment, cleaning up, etc.)—6 hr.

Crew required—3 men.

Cost per gallon of solution (f.o.b. Seattle)—$2.00.

Cost per pound of neutralizer salt—$0.01.

Analysis of Scale from Coil:

| | |
|---|---|
| Aluminum Oxide ($Al_2O_3$) | 1.71% |
| Calcium Oxide (CaO) | 48.27% |
| Iron Oxide ($Fe_2O_3$) | 1.29% |
| Silica ($SiO_2$) | 7.42% |
| Magnesium Oxide (MgO) | 2.46% |
| Loss on Ignition (Organic Matter, Carbon Dioxide, etc.) | 38.30% |
| Total Suspended solids in solution after it had been used for cleaning | 8.45% |

the large transformers have been partly cleaned by blowing them out with compressed air to remove the loose deposit of silt and slime. However, the coils in all of the transformers are slowly acquiring a coating of hard lime scale which we contemplate removing within a few years by the chemical solvent method described above. This substation is the only station at which water is cooled and recirculated. Additions made to compensate for evaporation and other losses are made from the city water supply which has normally 33 parts of lime per million. Hardness is 8.35 grains per gal. The original water supply for this station was pumped from a stream which drains a country rich in lime.

Washington Water Power has not been greatly troubled by the scale problem and where it has been a problem the removal of the scale has been easily, economically, and efficiently removed by the use of chemical solvents now on the market.

## Discussion

A. C. KELM: In cases where the coil is nearly blocked, chemical solution should be made thin and weak. As the opening becomes larger, it can be more concentrated.

J. HELLENTHAL: It is important to have a chemical analysis of the deposit in the coil, then you can determine what chemicals will act as a solvent.

# Modernizing Regulators

By M. F. HATCH
Washington Water Power Co.

ANALYSIS of utility budgets in the Northwest would no doubt show that a major part of annual expenses goes into the distribution system. Justification for this is, in almost every case, to provide increased capacity or improve voltage. In a good share of cases, limitation of load capacity grows out of improper voltage variations, or, to state it in another way, dollars spent on distribution often can be translated directly into volts drop, or volts regulation.

With this in mind, Washington Water Power Co. recently surveyed approximately 75 induction regulators (both single- and 3-phase) within the Spokane district, to determine the effectiveness of regulation, how this might be improved, and at what cost. It was found roughly that 20% of the regulators were holding voltage within no smaller than 7 volts total band width; 50% within 4 to 6 volts. In no case was the band being confined to less than 3 volts. These excessive widths were made necessary, in nearly every instance, by improper functioning of regulator control equipment, in main, of obsolete types.

As regulator limitations contribute directly to voltage variations on the feeder, it was apparent that considerable improvement in voltage, with resulting increase in feeder capacity, could be obtained by simply confining the limits of regulation to a small but reasonable figure. After some experimenting, it was found that with proper equipment, properly adjusted, a 2-volt band width could be held in every case without greatly increasing the maintenance cost of control equipment, and without creating undesirable hunting or faulty operation of the regulator itself. This value was then used as a standard in adjusting all regulators in the Spokane district.

It is fortunate that a single-phase induction regulator happens to be a fundamental device, costing in the neighborhood of $1,300, and controlled by equipment whose total value probably is $200. Fundamental operation of the regulator itself is just as satisfactory in a 30-year-old unit as in a brand new one, and in some cases, because of slower speed, is superior. Thus, simply modernizing control equipment may cause a 30-year-old regulator to operate as effectively as a new one. And by means of suitable housing, equipment can be adapted to modern outdoor substation design. Under a policy of maintaining voltage within certain standards, the extremely low cost of improving regulator effectiveness by methods outlined here, is very attractive and should be considered as the first expedient.

The following summarizes procedures that were followed in modernizing the different pieces of control apparatus. It happens that all these regulators are General Electric units. Hence, experience is confined to their type of equipment.

### Contact-Making Voltmeter

The brains controlling the regulator are within the contact-making voltmeter itself. While its adustment depends on other pieces of control apparatus, it is, nevertheless, the primary relay that recognizes voltage variations and determines the response. Our equipment consisted of various voltmeters—models B-7, B-12, B-15, B-18, B-20 and B-21. They represent several changes in design, but it was not until the advent of the B-21 type that a truly modern voltmeter was obtained. Its improvements include:

(1) Connection of the holding coil in series with the relay coil circuit instead of in parallel.

(2) Application of a resistor-capacitor pack, made up of four sections, to be connected in parallel with each of the holding coils and with each of the relay switch coils.

(3) Adoption of a more sensitive spring, restraining the pulling action of the solenoid so as to increase the contact separation per volt of adjustment.

(4) Decided improvement in means of adjustment making possible more precise and convenient adjustment and maintenance.

Application of the resistor-capacitor pack proved so effective in diminishing the current duty on main contacts that, although no information was obtainable as to the possibilities of applying it to older-style voltmeters, this was done in every case. The effect varied with different models, but proved very beneficial for every one except B-12. This model seemed to develop a resonance which made proper functioning of the voltmeter impossible. This was overcome, however, by substituting holding coils from a B-7.

In every case where the capacitor pack was installed, the holding coils were connected in series, thereby further reducing current duty on main contacts and providing more definite and more consistent holding effect. Another requisite in decreasing current duty is the use of 220-volt coils on the relay switch.

Use of the capacitor pack was found to eliminate entirely the radio interference commonly caused by contact arcing—which lately has become a serious problem. Thus the capacitor pack is proving to be a most useful refinement in voltage-regulator control.

Models B-12 and B-15 were found to have strong springs so restrained solenoid action that a contact adjustment of 2 volts produced very small contact separation. After much experimenting, the most effective corrective was found to be the lengthening of the plunger shaft so as to cause the plunger to operate in a different position within the solenoid, and thus be subject to less magnetic pull.

Cost of modernizing the contact-making voltmeters varied from $15 to $30, depending on whether new contacts had to be installed. This compares with $75 for a new voltmeter.

### Relay Switch

Many regulators still were equipped with their original carbon-block type of relay switch, and it was apparent that this would have to be changed to the newer type D-103 relay switch in order to get sufficiently fast and positive operation. Also, from a maintenance standpoint, replacement was considered

a good investment. This was done in every case. Observation disclosed that a relay switch having a shorter stroke than even the D-103, thus securing faster response, might be very desirable. It is planned to take this up with the manufacturer.

### Regulator Brake

Proper adjustment of the regulator brake probably has as much to do with the functioning of a regulator as any other one thing. Experiment indicated that desired results could not be obtained with the old-style spring-tension brake, and as magnetic brakes are available at nominal cost for mounting on all types of regulators that we have in service, we considered it a good investment to replace the old style brake in every case. Adjustment of the magnetic brake was found to be quite critical, and for proper operation it is essential that shoes be accurately lined up, rollers be properly spaced, sufficient spring tension be applied and the brake stator be in position for maximum torque.

### Line-Drop Compensator

It was not necessary to replace line-drop compensators, except the very old styles which did not have both resistance and reactance compensation, and certain old styles which were apparently overrated thus leading to burn outs. It was found that in various old models as well as occasionally in the new type compensator, calibrated ohms of reactance and resistance were not always exact and that it was very desirable actually to check the compensation obtained if settings were made from calculations.

By thus modernizing these four main items of control equipment, regulators of older vintage were made to operate with effectiveness comparable to those of today. Our company did not find it necessary to make radical changes in the regulator itself, although it was noticed in some cases that full regulation was not being obtained and that certain regulators rated at 2,200 volts primary, were considerably over-excited in voltage with resulting increases in noise and vibration.

Some companies have deemed it advisable to rewind the potential or teaser coils in regulators that were to be used on 4,160-volt 3-phase-wye feeders, or that would be subjected to potentials of 2,400-2,600 volts. Portland General Electric Co. has rewound 21 regulators since 1930 and has encountered no instance of trouble with the revamped windings, although of course a reduction in the amount of regulation would be expected, in some cases from 10% to as low as 7%.

Practically every company has had some experience in converting indoor regulators to outdoor use, either by using roof bushings and enclosed instrument transformers to make the regulator self-contained, or by building some kind of shelter for the unit. For several years we have been constructing a galvanized iron hood which covers the upper two-thirds of the regulator and under which are mounted control transformers and equipment. This has proved very satisfactory. Drawings are available from several of the companies showing typical specifications for this conversion. In all cases where regulators were moved, or converted for outside use, it was desirable to consider accessibility for inspection, oiling and maintenance of the appurtenant equipment.

## Discussion

J. HELLENTHAL: We have some 30-year-old induction regulators in service and this paper shows how these can be modernized.

A. VILSTRUP: Old regulators get noisy, which is an important factor sometimes when they are installed outside.

M. F. HATCH: If you step up the voltage on a regulator higher than rated, it gets noisy. The new ones have this characteristic too.

J. HELLENTHAL: In the old type, the cast-iron bearing on the lower step wears and becomes noisy. Now that Timken bearings are used, some of the noise trouble is overcome. As between induction and step-type regulators, the loss is higher in the induction type, sometimes an important factor.

M. F. HATCH (in answer to a question as to over-loading the current winding): We do not know what the over-load capacity is. We have operated them up to 150% of rating and even higher without apparent damage.

J. HELLENTHAL: The effect of loading regulators is cumulative. Sooner or later you will get an instantaneous failure from mechanical shock.

# Code Committee*

## Report on NFPA Electrical Committee

By M. T. CRAWFORD
Puget Sound Power & Light Co.

The National Electrical Code of the NFPA is important to nearly all the member companies of this Association, and in order to keep in close touch with proposals for revision, your chairman has been acting as one of the alternate members of the Electrical Committee, which is officially charged with the work of periodically revising the Code.

Since the last regular meeting of the Committee at Atlantic City in March 1937 there have been only a few interim revisions, by letter ballot, of relatively unimportant rules. Members of the Code Committee have been advised of these revisions and other developments from time to time by correspondence.

The next regular meeting of the Electrical Committee is tentatively scheduled for the week of December 10, 1939, at Atlantic City. At this meeting final action will be taken on all proposed revisions and a 1940 edition of the National Electrical Code will be prepared.

Meetings of the various article committees of the Electrical Committee were held a few weeks ago in New York City and reports prepared containing all the recommendations for code changes. These reports will be printed in the near future to give ample opportunity for consideration by all interested parties before the Electrical Committee meets in December. A copy will be sent by the chairman to each member of the Code Committee.

As you know, a number of constructive proposals for code changes have been made by Mr. Kellogg, President of the Edison Electrical Institute. The

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fourteen of us constituting the Light and Power Group on the Electrical Committee are most anxious that these proposals be given the fairest possible consideration. For the use of members in helping to popularize these proposals, a pamphlet has been prepared by Henry Morton which shows graphically the importance of code modernization, particularly in connection with the EEI proposals, and copies are available.

A sound film will be shown at this meeting which describes the covered neutral type of wiring which is one of the proposed steps in the modernization of code requirements. It is believed that these proposed changes are worthy of careful consideration and we should endeavor to explain their advantages at every opportunity, not only from a standpoint of encouraging more liberal use of wiring installations as a result of increased capacity for the same cost, but also the resulting increased amount of wiring work which will result from permitting more economical types of construction adaptable to modernization of old installations.

# Wattage Increases In Conduit Raceways

By S. B. CLARK
Northwestern Electric Co.

UTILITY engineers have done an excellent job in providing generating and distribution facilities to satisfy new loads but have not been awake to the dire necessity for increasing capacity in distribution facilities owned, maintained, and controlled by customers. Because certain proposed methods of increase are in some instances contrary to common practice and to Code requirements, it is essential that utilities strive to promote safe and economical methods of facility increase.

Included in customer-owned systems are commercial, industrial, and residential wiring—all in immediate need of more capacity. Future needs must also be considered, as it is reasonable to expect that development in electrical usages will again overload these facilities.

Increasing the capacity of service entrance and service equipment usually is neither complicated nor expensive for the above customer groups, but increasing facilities within a building frequently is costly.

*Commercial* customers will be considered here, and more particularly, that class of commercial buildings which includes larger office buildings, department stores, etc. Needless to say, eliminating present shortcomings, merely in regard to adequate illumination, would involve millions of dollars.

Where existing raceways are imbedded in building structures, and where circuit-capacity increase is necessary, the cost, under present Code limitations, is prohibitive. A means of increasing capacity without increasing raceway size is the logical thing to consider. If such be found safe, it is then in order to adjust Code limitations to permit its use.

The possibilities of wattage increase in conduit raceways over present Code limitations may be divided into five sections:

1. If the existing circuit is 2-wire, by changing to 3- or 4-wire.
2. If existing conduit circuit is 3-wire, change to 4-wire, 3-phase, providing this type of distribution is available.
3. Larger conductors to replace existing conductors if space factor is available.
4. Existing conductors replaced by larger conductors and neutral conductor without insulation, thereby using insulation space for additional copper space.
5. Conductors with reduced insulation thickness.

The first method presents few complications, but in general does not offer great possibilities because very few installations are of the 2-wire type.

Column 1, Fig. 1 exhibits the geometry of raceway space factor and attendant carrying capacity as allowed by Code.

In the second case (above) where the 4-wire, 3-phase service is obtainable, a change from 3 to 4-wire in accordance with Code requirements, results in a material increase in wattage.

An example showing approximate comparison of the four different methods and which shows why the 4-wire 3 phase system is the most efficient is given in Chapter 9 of the National Electric Code.

Present Code requirements limit raceway fill, where three or more conductors are involved, to approximately 40%. Where raceways are not over long and contain a limited number of bends, the fill of raceways can be safely increased above the 40% limit without damage to insulation when conductors are drawn into place.

Without giving consideration to heat dissipation, it is assumed that conductor space can, on the average, be increased to 80% of the raceway diameter.

In the third possibility, with this increase of space factor allowed, an increase in wattage will be obtained in the majority of raceways over and above wattage capacity as allowed by National Electric Code. Column 2, Fig. 1, compares over-all diameter space of conductors with total space of raceway. Possible wattage increase for all conduit sizes is shown in Table I.

Substituting a bare conductor for the insulated conductor used in Case 4, additional copper fill may be obtained. Column 3, Fig. 1 compares the over-all diameter space of conductors with diameter of raceway. Wattage increase is not consistent in all sizes of conduit, because of the relationship of available Standard Code conductor diameter to conduit diameter. Wattage increase values are shown in the table.

As to the fifth possibility. Although not yet approved by the National Electric Code, several manufacturers have produced conductors in sizes from No. 14 to No. 8 either with smooth insulation of heat-resisting rubber and/or with thin braid, both listed at 75 deg. C. as against Code type-R wire 49 deg. C., and with a total insulation thickness of 2/64 in. as against 3/64 in. of the present type-R Code wire. This thin wall insulation will allow higher temperatures in conductors and may eventually lead to a rated increase in carrying capacity, perhaps equal to that capacity now given in Code ratings for varnish-cambric insulation.

This material is still rather high in cost, but, considering the possibilities of increased raceway fill over the 40%, now allowed, and the probable safe operation of conductors at higher temperatures without insulation deterioration, an increase in wattage capacity may be obtained at reasonable cost.

Complete conduit fill tables for thin wall conductors, sizes 14, 12, 10 and 8 have been prepared by a committee making a study of the above and will be ready for general distribution within the near future.

Column 4, Fig 1 shows the various combinations of the thin-wall conductors in ½-, ¾- and 1-in. conduit which yield the wattage increases shown in Table II.

It is not intended to advocate reduction of raceways under present standards in new building construction, but to provide a means for immediately increasing wattage capacity in existing building raceways.

In order to make available to the building owners and contractors the advantages of the possible wattage increase in conduit raceways, National Electric Code rules covering the number, size and carrying capacity of conductors in conduit and steel tubing raceways must in some manner be revised. Thin wall insulated conductors are now receiving attention by the Underwriters Laboratories and with the efforts expended by several manufac-

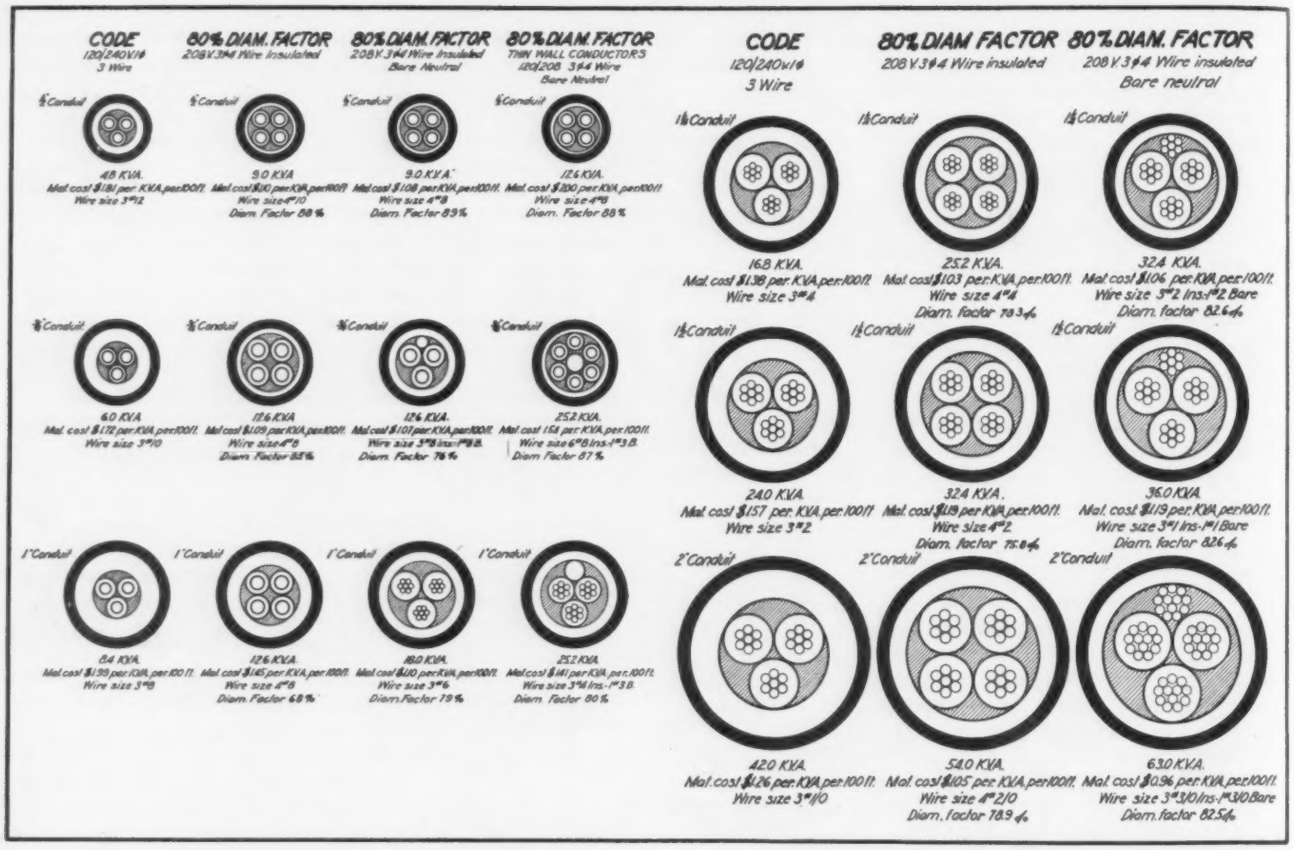
CODE
120/240V 1ϕ 3 Wire
80% DIAM. FACTOR
208 V. 3ϕ4 Wire Insulated
80% DIAM. FACTOR
208 V. 3ϕ4 Wire Insulated Bare Neutral
80% DIAM. FACTOR
THIN WALL CONDUCTORS
120/208 3ϕ4 Wire Bare Neutral
½ Conduit
4.8 KVA.
Mat. cost $1.81 per KVA. per 100 ft.
Wire size 3#12
9.0 KVA
Mat. cost $1.20 per KVA. per 100 ft.
Wire size 4#10
Diam. Factor 88%
9.0 KVA.
Mat. cost $1.08 per KVA. per 100 ft.
Wire size 4#8
Diam. Factor 89%
12.6 KVA.
Mat. cost $1.20 per KVA. per 100 ft.
Wire size 4#8
Diam. Factor 88%
¾ Conduit
6.0 KVA
Mat. cost $1.72 per KVA. per 100 ft.
Wire size 3#10
12.6 KVA
Mat. cost $1.09 per KVA. per 100 ft.
Wire size 4#8
Diam. Factor 85%
12.6 KVA.
Mat. cost $1.07 per KVA. per 100 ft.
Wire size 3#8 Ins.-1#8 B.
Diam. Factor 76%
25.2 KVA.
Mat. cost 1.54 per KVA. per 100 ft.
Wire size 6#8 Ins.-1#8 B.
Diam. Factor 87%
1" Conduit
8.4 KVA.
Mat. cost $1.39 per KVA. per 100 ft.
Wire size 3#8
12.6 KVA.
Mat. cost $1.45 per KVA. per 100 ft.
Wire size 4#8
Diam. Factor 68%
18.0 KVA.
Mat. cost $1.00 per KVA. per 100 ft.
Wire size 3#6
Diam. Factor 79%
25.2 KVA.
Mat. cost $1.41 per KVA. per 100 ft.
Wire size 3#4 Ins.-1#8 B.
Diam. Factor 80%
CODE
120/240v 1ϕ 3 Wire
80% DIAM FACTOR
208 V. 3ϕ4 Wire insulated
80% DIAM. FACTOR
208 V. 3ϕ4 Wire insulated Bare neutral
1¼ Conduit
16.8 KVA.
Mat. cost $1.38 per KVA. per 100 ft.
Wire size 3#4
25.2 KVA.
Mat. cost $1.03 per KVA. per 100 ft.
Wire size 4#4
Diam. factor 78 3/4%
32.4 KVA.
Mat. cost $1.06 per KVA. per 100 ft.
Wire size 3#2 Ins.-1#2 Bare
Diam. factor 82.6%
1½ Conduit
24.0 KVA.
Mat. cost $1.57 per. KVA. per 100 ft.
Wire size 3#2
32.4 KVA.
Mat. cost $1.19 per KVA. per 100 ft.
Wire size 4#2
Diam. factor 75.6%
36.0 KVA.
Mat. cost $1.13 per. KVA. per 100 ft.
Wire size 3#1 Ins.-1#1 Bare
Diam. factor 82.6%
2" Conduit
42.0 KVA.
Mat. cost $1.26 per. KVA. per 100 ft.
Wire size 3#1/0
54.0 KVA.
Mat. cost $1.05 per. KVA. per 100 ft.
Wire size 4#2/0
Diam. factor 78.9%
63.0 KVA.
Mat. cost $0.96 per. KVA. per 100 ft.
Wire size 3#3/0 Ins.-1#3/0 Bare
Diam. factor 82.5%

Fig. 1—Conductors in raceways

turers to produce a suitable thin-wall conductor, Code recognition no doubt will be obtained in the near future. Code rules must be revised to extend the use of bare neutral beyond service equipment and into the building raceways.

It might, for the present, be advisable to incorporate in the National Code, and in local codes, separate tables covering only the replacement of existing conductors. In several cities, local code authorities have permitted the use of bare neutral and increase in conductor sizes beyond present code limitations in existing buildings where immediate load increase was desired.

## Table II

(120-208 V. 3-Phase, 4-Wire)
(Thin Wall Insulation 80% Diam. Factor)

| Conduit Size | ½-in. | ¾-in. | 1-in. |
|---|---|---|---|
| Wire Size | 4-No. 8 | 6-No. 8 | 9-No. 8<br>1-No. 3B |
| | | | 1-No. 1B |
| Kva. Capacity | 12.6 | 25.2 | 37.8 |
| % Increase over single-phase code | 162.0 | 320.0 | 450.0 |
| Space Factor | 38.6 | 41.0 | 31.2 |
| Material Cost/KVA/100 Ft. | 2.00 | 1.54 | 1.59 |

In reviewing the foregoing and repeating that all comparisons in per cent of wattage increase are comparisons based upon carrying capacity of conductors as allowed in Table 1, Chapter 9 of the National Electric Code, due consideration must be given, with the increase of the number of conductors in the raceway, to conductor loading and heat dissipation and new carrying capacity tables formulated.

The Rasch committee, sponsored by NEMA, reported in detail their findings relative to safe current carrying capacities of rubber covered wires in raceways in the March 1938 issue of *Electrical Engineering*. Table XI of this

## Table I—Comparison of Capacities, Space Factors, Etc.

| Conduit Size (Inches) | ½ | ¾ | 1 | 1¼ | 1½ | 2 | 2½ | 3 | 3½ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | (3-Wire, 1 phase, 120-240-Volt Code) | | | | | |
| Space Factor | 37.8 | 25.8 | 24.8 | 32.0 | 38.8 | 28.1 | 36.3 | 24.6 | 39.4 |
| Wire Size | No. 12 | No. 10 | No. 8 | No. 4 | No. 1 | No. 3/0 | 250 M | 500 M | 750 M |
| Capacity (kva.) | 4.8 | 6.0 | 8.4 | 16.8 | 24.0 | 42.0 | 60.0 | 96.0 | 126.0 |
| Material Cost/KVA/100 Ft. | 1.81 | 1.72 | 1.99 | 1.38 | 1.57 | 1.26 | 1.79 | 1.33 | 1.60 |
| | | | (120-208-Volt, 3-Phase, 4-Wire Code) | | | | | | |
| Space Factor | 44.6 | 34.4 | 33.0 | 28.6 | 41.2 | 37.2 | 42.2 | 36.6 | 40.0 |
| Wire Size | No. 14 | No. 10 | No. 8 | No. 6 | No. 2 | No. 1/0 | No. 4/0 | 300 M | 500 M |
| Capacity (kva) | 5.4 | 9.0 | 12.6 | 18.0 | 32.4 | 45.0 | 81.0 | 99.0 | 144.0 |
| Material Cost/KVA/100 Ft. | 1.40 | 1.26 | 1.45 | 1.28 | 1.19 | 1.17 | 1.17 | 1.46 | 1.24 |
| % KVA Inc. over 1-Phase | 12.5 | 50.0 | 50.0 | 7.0 | 35.0 | 7.0 | 35.0 | 3.0 | 11.5 |
| | | | 120-208-Volt, 3-Phase, 4-Wire, 80% Diam. Factor) | | | | | | |
| Space Factor | 62.6 | 53.5 | 33.0 | 42.7* | 41.2 | 41.7* | 48.5 | 45.0 | 47.0 |
| Wire Size | No. 10 | No. 8 | No. 8 | No. 4 | No. 2 | No. 2/0 | 250 M | 400 M | 600 M |
| Capacity (kva) | 9.0 | 12.6 | 12.6 | 25.2 | 32.4 | 54.0 | 90.0 | 117.0 | 170.0 |
| Material Cost/KVA/100 Ft. | 1.10 | 1.09 | 1.45 | 1.03 | 1.19 | 1.05 | 1.36 | 1.49 | 1.09 |
| % KVA Inc. over 1-Phase | 87.0 | 110 | 50.0 | 50.0 | 35.0 | 29.0 | 50.0 | 21.0 | 35.0 |
| | | | 120-208-Volt, 3-Phase, 4-Wire, 80% Diam. Factor, Bare Neutral) | | | | | | |
| Space Factor | 50.0 | 42.6 | 47.8 | 45.5 | 43.0 | 40.6 | 47.0 | 45.5 | 53.3 |
| Wire Size | No. 10 | No. 8 | No. 6 | No. 2 | No. 1 | No. 3/0 | 300 M<br>2-No. 3/0B | 3-500M<br>2-250MB | 3-800M<br>2-400MB |
| Capacity (kva.) | 9.0 | 12.6 | 18.0 | 32.4 | 36.0 | 63.0 | 99.0 | 144.0 | 206.0 |
| Material Cost/KVA/100 Ft. | 1.08 | 1.07 | 1.10 | 1.06 | 1.19 | 0.96 | 1.37 | 1.11 | 1.17 |
| % KVA Inc. over 1-Phase | 87.0 | 110.0 | 114.0 | 93.0 | 50.0 | 50.0 | 65.0 | 50.0 | 64.0 |

report shows a decrease in current carrying capacities for rubber covered wires, especially of the larger size conductors over capacities allowed in National Electric Code, which if adopted as standard, will very materially upset the possibilities of the methods so far proposed. The next possibility, then, would be to reduce insulation thickness on the larger size conductors. This no doubt will soon become an accomplished fact.

## Discussion

M. T. CRAWFORD: Certain building owners in Seattle have become embarrassed by not being able to give their tenants lighting at the new higher level of illumination on account of inadequate wiring. The answer lies in finding some way of increasing capacity in existing raceways.

F. H. MURPHY: The 4-wire, 3-phase system has helped to increase load in existing buildings. Mr. Clark's paper is another step forward.

MAJOR H. S. BENNION: Many large buildings throughout the country, 10 years old or more, are handicapped for installing modern lighting and air conditioning. A recent estimate for rewiring a large building in Detroit ran to $260,000. The New York Edison Co. is re-wiring its building at a cost of $200,000. An estimate on rewiring a chain store for relighting and air conditioning ran to $70,000, but by getting the approval of local authorities for pulling in bare neutral, the cost was only a few hundred dollars. Commercial load building is dependent on meeting this re-wiring problem.

Two facts bear on this: (1) The customer will not spend the money to rip out the walls and replace wiring; (2) The companies concerned, who may have spent considerable money for residential load building and commercial cooking—items requiring a subsidy—won't spend an equivalent amount of money to rip out walls, re-wire, and then plaster the walls up again.

We have developed substantiating data to deliver to the I.A.E.I. prior to their sectional meetings. This is now being printed and will be delivered soon. Illustrated pamphlets have been prepared by E. A. Brand and Henry J. Morton, chiefly to show our own people what the practical application of these data means.

L. W. GOING: N.E.C. rules have grown haphazardly. Nobody knows how the code arrived at the number of wires that are allowed to be pulled into a conduit. We must remember, however, that we have to pull them out again when they have become stuck to the conduit through use and heat; possibly a committee should study this situation and determine how many wires can be pulled through straight conduit and around bends. The number of bends is a factor and the Portland Code takes this into consideration.

S. B. CLARK: I can find no basis for the assumption of the 40% factor in the Code. I see no reason why we shouldn't assume 100%. We are making tests on this now.

H. S. BENNION: That is the kind of material we are providing to the I. A. E.I. One reason for adopting 40% was to leave room for increase later.

S. C. LINDSAY: We have used grease inside of pipes to pull in cable. Maybe this principle can be applied to conduit.

F. D. WEBER: We have checked 60 WPA projects, and you would be surprised at the wiring specifications they contain. There are a lot of people designing wiring who are not capable engineers. Development of the N.E.C. has been a compromise all along the line because of so many conflicting viewpoints and interests. The agenda of the Electrical Committee is prepared well in advance, and there is ample opportunity to get new ideas before the Committee, but these ideas must go through the proper channels. When the proposal for bare neutral was introduced, we got objections from the Water Works Assn. and their investigation of the situation has delayed action on this point. The N.E.C. is a big proposition and a costly one to revise. Action will necessarily be slow, but it is always speeded up when complete data can be placed before the Committee.

H. A. PATTON: As to bare neutral, we will have to show the Committee more engineering data than have yet been presented. The Committee wants to know what will be the effect of unbalanced load in the building. One solution on new buildings is more raceways. In old buildings we have frequently used the elevator shaft for additional conduit runs.

# Transmission and Distribution Committee*

## Common Neutral

### Discussion

**(For location of article under discussion consult index)**

A. C. KELM: In Salt Lake, the primary neutral is grounded about every 1,000 ft. The secondary neutral is grounded to the water pipe. Then the primary and secondary grounds are connected together at each transformer. This makes a very complete, grounded system. This construction did not lend itself to common neutral where the secondary is continuous. Whether the common neutral is used or not, depends on geographic conditions. Each secondary neutral should have a good positive ground.

C. H. HOGE illustrated grounding of a continuous neutral. There should always be a metallic ground on each side of the transformer and at the transformer neutral, he said.

R. S. DANIELS: We have finally accepted the common neutral grounded system.

E. W. CONROY: We take the precaution of isolating the last transformer on a long radial feeder.

R. J. DAVIDSON (in answer to a question as to whether grounds on customers' premises are required): In Oregon and Washington the state codes are based on the N.E.C. Customers' grounds are required.

L. R. GAMBLE: In our territory, the customer has a ground in connection with his house wiring. In rural areas we try to ground to a well casing.

* R. J. Davidson, Pacific Power & Light Co., chairman; L. R. Gamble, The Washington Water Power Co., vice-chairman; Allis Chalmers Manufacturing Co., C. T. Hurd; B. C. Electric Railway Co., P. C. Gill; The California Oregon Power Co., R. S. Daniels; Eastern Oregon Light & Power Co., O. D. Lanning; General Cable Corp., W. E. Wallace; General Electric Co., C. E. Canada; Graybar Electric Co., E. J. DesCamp; Grays Harbor Railway & Light Co., F. J. Robbins; Idaho Power Co., H. M. Jones; Mountain States Power Co., Walter Smith, Northwestern Electric Co., D. A. Hord, Corbett McLean, E. F. Pearson; Oregon State College, F. O. McMillan; Pacific Electric Manufacturing Corp., C. H. Cutter; Pacific Power & Light Co., A. E. Bond; Portland General Electric Co., W. E. Enns, H. R. Wakeman; Puget Sound Power & Light Co., C. H. Hoge, E. R. Nigh; Telluride Power Co., P. P. Ashworth; Utah Power & Light Co., G. W. Westcott; The Washington Water Power Co., Earl Baughn; West Coast Power Co., Henry Berk; Westinghouse Electric & Manufacturing Co., M. P. Buswell; Thos. S. Wood Co., T. S. Wood.

# P. F. Correction

## On the B. C. Electric Railway Co. System

By J. H. STEEDE
B. C. Electric Railway Co., Ltd.

POWER-FACTOR correction has been extensively applied to the mainland system of B. C. Electric Railway Co., for the past 16 years. Previous to 1922, the amount of correction was confined mainly to the varying reactive power output of a number of 12-kv. synchronous motors driving generators which supply a portion of d.c. power for interurban and street railways. Due to substantial load increases experienced at that time, and to the fact that the combined peak load power-factor at the generating stations was only 80%, the system peak load was approaching the total generator capacity.

A study resulted in placing an order for two additional motor-generator sets designed primarily for power-factor corrective purposes. The larger set consisted of a 6,000-kva. synchronous motor driving a 1,000-kw. generator. This was installed on the 2,300-volt bus at Main St. substation, in Vancouver. The generator normally supplies a limited amount of power at 550 volts for commercial d.c. service, although it is available also for railway power when needed. The other unit was a 1,000-kw. generator driven by a 3,750-kva. 12-kv. synchronous motor. This set was installed at Burnaby substation, providing additional power for the railway.

As well as improving the peak load power-factor and providing additional peak load generator capacity, installation of these machines decreased transmission losses. The metered high-tension losses in 1924 compared with 1923 showed a decrease from 13.9% to 10.8%, or 3.1% of the generated output. On the basis of the 1923 output, this indicated an annual saving of approximately 8,100,000 kw.-hr.

In 1923, a study was made of the distribution system, and a series of tests carried out on loads of all industrial power consumers. The customers with low power-factor loads were informed of this condition, advised again of the company's service requirements in this regard, and offered assistance in meeting these requirements in the most economical way. By 1931, approximately 11,400 kva. of corrective apparatus was in use in customers' plants. Capacitors comprised approximately 55% of this capacity.

Previous to installation of the m.g. sets, a number of 2,300-volt static condensers were purchased: three of 250 kva., one of 75 kva., and one of 25 kva. Two of the large units were installed in 1922, in a small substation feeding an industrial area; the others were applied to power customers' loads during 1923.

These condensers were of the so-called tank type with three phases assembled in one steel tank.

Experience with these was unsatisfactory. All broke down after various periods of service. Three failed during the first two years; one was replaced and two were repaired but broke down again in two years' time. One 25-kva. unit was in service for nine years before it showed signs of distress. It was repaired in 1933, and the working voltage reduced 30% by re-grouping the cells. This unit operated successfully at reduced capacity until removed from service in 1938.

A number of failures also occurred on customers' equipment of similar design and voltage rating, purchased in 1924 and 1925. Condensers of the same type but designed for 550-volt operation have been more successful, particularly those used without auto-transformers. A number of between 14 and 15 years old are still in constant use.

Condensers installed since 1926 have been mainly unit type. Failures on unit-type equipment of all makes and voltage ratings have been low, amounting to 1.65% out of 4,560 kva. installed. Practically all is oil filled.

In 1924, a Fynn-Weichsel motor was installed on a fan drive in one of the company's substations. About 40 synchronous induction motors of this type and of the Crompton-Parkinson auto-synchronous design were installed during the next six years, mainly in sizes from 20 to 75 hp.

In larger sizes, various types of synchronous motors have been used, as well as a few synchronous condensers.

Since 1932, the amount of corrective apparatus added to the system has not been appreciable, due to the slow growth of industrial load. No experience has been had with pole-mounted capacitors or correction applied to other than power feeders.

In 1936, a study was made to determine, in part, the value of additional correction to the system. This study was confined to the high-tension portion of the system, which may be briefly described as follows: Power is generated in five hydroelectric plants of a total capacity at that time of 167,325 kva. Transmission to Vancouver and vicinity, the main centre of load, is by means of five main 60-kv. and four 34-kv. lines, with a number of tie lines. Longest main transmission line is approximately 32 mi. The capacitance of these lines is relatively low, and the charging current small in consequence. The combined power-factor of the generators is lagging under all conditions of load, and varies from 80% to 87% at peaks to approximately 60% during the light load periods. The annual system load factor varies from 48% to 50%.

This study was based on conditions on an average day—April 30, 1936. The average loads and power-factors were determined as closely as possible for all transmission lines and high-tension transformers. Losses were calculated for these load conditions, and then for 0.9 p.f. operation of lines and transformers. The reduction in losses for operation under the latter condition would be 10,243 kw.-hr. for this average day studied.

The amount of corrective capacity necessary on the load side of the receiving transformers to raise the average power-factor to 0.9 at each of 27 receiving buses amounted to 14,665 kva.

The application of this corrective capacity would have considerable effect in reducing the generating station capacity required for the system peak load. The peak load power-factors for the month of December in the years 1935, 1936 and 1937 were .862, .872 and .858 respectively. With a peak load power-factor of .864 and a system peak of 110,000 kw., the peak load kva. is 127,300. The addition of 14,665 kva. in corrective capacity would raise the peak power-factor to approximately .912, and reduce the peak kva. to 120,600, a reduction of 6,700 kva. There would be a corresponding reduction in transmission line and receiving substation capacity required for peak load conditions.

If this correction were applied on the secondary side of the distribution transformers at or adjacent to the customers' loads, or at the load centres on the distribution feeders, it would also benefit the 12-kv. and distribution portion of the system. The saving through the additional reduction in losses, the benefit from better distribution voltage regulation, and the saving through deferred investment in additional feeder or voltage regulating equipment, would be difficult to determine in a general way. Analysis of conditions on individual feeders or groups of feeders is possible, however. Indications are that further correction on many feeders would be a profitable undertaking when the effect on the high-tension system is also taken into consideration.

In advocating power-factor correction, the engineer may be faced with

two difficulties. His proposals may be entirely sound, both technically and economically, but it requires salesmanship to persuade a customer to install corrective equipment. Close cooperation between the engineering and sales staffs of a utility is therefore essential in the furtherance of this endeavor.

The effect of correction on the monthly power bill has a natural appeal to the customer, but he may be skeptical of any other benefit.

The other difficulty exists within the utility. Installations of corrective equipment are neither conspicuous nor spectacular. It may require persistent salesmanship also to persuade the utility management as to the importance of such installations and the necessity for continuous effort in this direction. It is helpful in this connection to prepare and present occasionally a complete picture, in simple outline, showing not only the nature of the individual installations, but also their aggregate effect on the power system as a whole.

# Use of Capacitors In the Northwest

By WALDO E. ENNS
Portland General Electric Co.

TO obtain this information questionnaires were sent to all members of the Transmission and Distribution Committee. The number of capacitor installations reported was not great. In the replies received from committee members whose companies are not using capacitors at this time, it is of interest that all have considered their use.

The large growth shown for installations on power systems for 1939 was due largely to large block of capacitors reported on order for the City of Seattle, Department of Lighting. The greater part of the capacitors in use are customers' installations. However, if the trend indicated for 1939 continues the number of capacitors used on power-system feeders may grow to equal or surpass the customers' amount.

### Customers' Installations

Whereas the installation of capacitors on power system feeders is a recent development, in the Northwest area the first customer-installations reported were made in 1924 on the British Columbia Electric Railway system. This company has 46 of the total of 54 customers' installations listed. Three other companies have reported customers' installations as follows: Pacific Power & Light, two; Washington Water Power, five, and West Coast Power, one.

Of the 54 customers' installations reported, all but two were installed to reduce power bills by reason of a power factor, or kva.-demand clause in the contracts. It appears that some such clause is economically justified because it is a well-known fact that the maximum possible benefits to the power system are obtained when power factor correction is made at the load.

**Table I—Capacitors on Customers' Premises**

| | |
|---|---|
| Number of companies reporting customer installations in service | 4 |
| Kva. installed | 8,855 |
| Number of installations | 54 |
| Number due to P. F. clause in contract | 52 |
| Number manually cut in and out with load changes | 47 |
| Range of power factors at peak load before correction | 55%—80% lag |
| Range of power factors at peak load after correction | 79%—100% lag |

Another point of interest in the case of the customers' installations is that 47 of the 54 are annually cut in and out with load changes. The economics of this problem of locating and switching of capacitors in the customers' plant will not be discussed here, but it is generally true that cutting the capacitors in and out with load changes reduces the amount of voltage variation between heavy and light-load conditions on the plant circuits and the power system feeders. However, it is also true that if capacitors are located on the load side of motor switches, for example, more capacitance would be required to give a desired amount of correction at peak load unless all such switches are closed at that time.

The customers' installations reported by Pacific Power & Light were the two not attributable to a power-factor clause in the contract. These appear to be well justified because the reduction in RKVA at the generating plant made it possible to drop one generator, and excessive voltage drops were reduced so that voltage conditions at the load were improved.

In a paper presented in 1938, entitled "Some Economic Considerations in the Use of Shunt Capacitors" by G. E. Bishop and the writer, the theory and economics of applying capacitors to power systems were discussed in some detail and will not be repeated.

Of four capacitor installations now in service on overhead primary feeders, the purpose was, in each case, to obtain a boost of voltage to a load center. The power factor on these feeders before correction was relatively high so that the other benefits of reducing losses and increasing substation capacity would be small. These are good examples of the use of capacitors to give a voltage boost and are of particular interest because they indicate that in some cases it is possible to justify the investment in capacitors on the basis of this one benefit only.

An interesting example of increasing load carrying ability of an underground feeder where current was the limiting factor was reported by Idaho Power on its Boise underground lighting feeder No. 2. On this 4-kv., wye, grounded feeder, the annual 3-hour peak load on phase B was considerably in excess of the rated capacity of the substation cable and induction voltage regulator. To defer replacing cable and regulator, this peak load current on B phase was reduced 10% by raising the power factor from 91% to 100% by installing 135-kva. of capacitance on the B leg of the wye. This installation is a good example of using capacitors to defer large expenditures where current or heating is the limiting factor.

**Table II—Capacitors at Substations or Scattered Load Centers**

| | |
|---|---|
| Companies reporting installations | 2 |
| Kva. installed | 885 |
| Power factor at peak load before installation | 83% to 98.9% lag |
| Power factor at peak load after correction | 92% lag to 98.9% lead |
| Number of units reported failed | 2 |
| Number of fuses reported blown | 1 |

**Other Data**

| | Number of installations |
|---|---|
| Location at substations | 0 |
| On primary feeders at load centers | 5 |
| Locations: | |
| At substations | 0 |
| On primary feeders at load centers | 5 |
| Reason for installing: | |
| To decrease current | 1 |
| To raise voltage | 4 |
| Removed from circuit at light load | 0 |
| Protection: | |
| With lightning arrestors | 0 |
| With fuse cutouts | 5 |
| Telephone interference: | |
| Causing interference | 0 |
| Correcting interference | 1 |

The data reported for the proposed installations on the City of Seattle system show that they also plan to locate their capacitors at load centers on primary feeders. In regard to anticipated benefits, the kw. carrying ability of the existing conductors, which is dependent on the allowable voltage drop, but independent of the load power factor, should be improved considerably due to the boosting effect of the capacitors. Furthermore, due to relatively poor power factors at peak load before correction, a correction from 65% to 85% or 90%, due to the reduction in current, will yield real benefits in the form of released sub-

station capacity and reduction of copper losses in lines and equipment.

The only capacitor installation reported in which units were placed at the substation was an interesting though very special one. The description as given by H. M. Jones of Idaho Power follows:

"This is a temporary installation which we had in operation during the irrigation season last year. A 135-kva. bank (45-kva. per phase) was installed at one of our 11-kv. rural substations for service during the irrigation pumping season only. At the start of the irrigation season Mountain States Telephone and Telegraph Co. began experiencing inductive interference on their toll circuits in a large area surrounding this substation. The telephone engineers determined that the interference was the sixteen harmonic of 60 cycles and that the source was the Milner Pumping Plant of the Wilner Low Lift Irrigation District. The cause of the harmonic generation was traced to the type of windings on the large pump motors. Our 11-kv. distribution lines parallel the telephone lines for some distance and this harmonic in turn was induced on the telephone circuits, resulting in excessive interference.

"The bank of capacitors was installed at the feed terminals of the distribution lines in an effort to absorb the harmonic. This reduced the interference on the toll circuits to a point where it was no longer troublesome and the installation remained in service for the remainder of the season. The distribution voltage at the substation is 11-kv. grounded wye and as 6,900-volt capacitors were not immediately available, 2,300-volt units were used, three in series on each leg of the wye. No operating difficulty was experienced and it is very probable that we shall be forced again to install this bank during the coming season."

No case of telephone interference because of capacitors was reported and the installation just described was the only one which mentioned the effect of capacitors on communication circuits, and in this particular case the capacitors were effective in reducing interference.

In conclusion, it appears reasonable to anticipate a further gain in the use of capacitors in the Northwest area. The cost per kva. of capacitance is reduced and the units now in service are reported to be doing a good job with very little trouble. Also, with increasing loads, especially if they are lower power factor, engineers will use every method possible to defer the large expenditures required to replace existing facilities, and the capacitors are quite certain to be the economic answer.

## Discussion

H. M. JONES: We have a few capacitors in use—some on the line and some on the customers' premises. We had telephone trouble on a line to a pumping plant. When we installed three 15-kva. capacitors, a 500-hp. motor burned up. We are not sure what caused this. The noise was going through the 44-kv. substation and out on the 11-kv. line. Capacitors on the low side of the station cut the noise out.

# Transformer and Line Fusing

By C. H. HOGE
Puget Sound Power & Light Co.

CONSIDERABLE study has been given during recent years to proper fusing of distribution transformers and lines and to coordinating line-sectionalizing fuses with automatic switching equipment in substations. The cost of line-transformer fusing for single-phase installations up to and including 25 kva. averages from 2 to 9½% of total installation cost for 2.3/4-kv. transformers and from 2 to 14% for 6.6/11-kv. transformers. Obviously, this is an important item, as any saving in line extension cost would possibly permit a greater coverage of the area served.

It has been the practice in the past to let the automatic switch or fuse on the intermediate step-down transformer bank clear line troubles and overloads. This has resulted, through growth of the distribution system, in large areas being deprived of electric service for considerable periods of time. Interruptions of this magnitude can be prevented by the proper coordination of tratnsformer and line sectionalizing fuses with the substation breakers.

Under the heading of "New and improved methods of primary line and transformer fusing," two companies report that on important lighting circuits in cities, automatic reclosing is accomplished with the oil circuit breaker controlled by induction over-current relays for trip and with a timing relay set for two reclosures. The practice of installing automatic reclosing is being extended to include 6.6/11-kv. and 13-kv. primary lines because cheaper methods are available, such as repeater fuses and small, automatic-reclosing oil circuit breakers or air-break switches. There is no difficulty in coordinating transformer or line fuses with repeater fuses if the links have similar current-time characteristics. However, it is desirable to standardize on a make of fuse links with as few sizes as possible to cover the range requirements. A careful check must be made to determine the proper selectivity between repeater fuses on primary circuits and the automatic reclosing oil circuit breakers, because of the difference in current-time characteristics. Several companies have been using recloser fuses and service restorers for a number of years, with results favorable enough to warrant continuation.

The question of banking transformers connected to a secondary grid through secondary fusing, in addition to primary fuses, is being given much consideration. One company reports a residential area of 25 blocks, with 196 services, where secondaries were tied to unfused secondary grid. According to past practices, load growth would have necessitated cutting this large grid into three separate grids, with primary extension to new transformers. Instead, this large grid was broken into three grids by installing circuit-breaker insulators in the hot secondary wires, but some of these breaker insulators were shunted out by fuses. By doing this, primary lateral extensions and new transformers were reduced to a minimum. This gives the advantage of load diversity of a large grid during normal operation, and in case of a fault in one grid the fuses will blow to clear the faulty area from the other two grids. The disadvantage of this scheme, if not given careful inspection, is that minor faults may blow the sectionalizing fuse and not the primary fuse, which may overload transformers and result in poor voltages on some services.

Another company banks a maximum of five distribution transformers in parallel, all tied in solid on the secondary bus. No fusing is placed in the secondary side of transformer in bank, but it is felt that from an operating standpoint the placing of fuses in the secondary between transformers would be good practice. Where currents are normally low, secondary fuses would cut down the size of districts out of service at any one time and would prevent the burning up of transformers. Several other companies, with practically no experience with banking transformers on the same secondary bus, feel that transformers in parallel should have the secondary bus fused between transformers in addition to the primary fuse.

One company is eliminating all parallel connection of transformers to secondaries except where paralleled transformers are mounted on same rack. In rural areas, this company uses a number of type CSP transformers with satisfactory results. This type of transformer combines the features of primary and secondary protection. Another company makes it a practice to use secondary as well as primary fuses on all transformers. The secondary fuses are ordinary, inexpensive cartridge-type open fuse blocks, mounted on a white porcelain base and fastened under the crossarm. Recently installed were 20 single-bushing type rural transformers rated, 7,200-120-240 volts. These have

a weak link in the primary lead, inside the transformer case, which, in case of trouble, will cut the transformer off the line. No other primary fusing is used, but transformer secondaries are connected to bus through secondary fuses. Transformer secondaries are not paralleled. Two other companies state that where transformers are banked on the same bus, fuses are installed on both the primary and secondary side.

The present distribution system for the Seattle metropolitan area is a 2,300-4,000-volt star primary with common neutral grounded at the substations and with multiple grounds throughout the circuit areas. Three-phase circuits radiate from each substation for the lighting load each phase being separately regulated for its individual area. Each circuit is composed of a No. 4 copper wire primary, and secondary grid or network, with all transformers in the circuit area banked together on the primary and secondary side. Practice is to fuse each transformer on the primary side only.

No trouble has developed by transformer fuses cascading during overload or short circuit on the secondary bus, because the impedance of the small wire limits the current that can flow. Generally, this current is insufficient to blow the fuses on adjoining transformers on the same circuit. When transformer fuses are blown, a low-voltage condition exists immediately around the transformer. This generally results in a voltage complaint, and the refusing of the transformer. The practice of banking all transformers in a given area not only largely eliminates lamp flicker from small power loads but also allows the use of a much smaller total transformer capacity, because of load diversity, than would exist if transformer were not paralleled. This system also provides uniform voltage distribution throughout the circuit with a minimum of connected transformer capacity. If the transformers were banked with fuses in the secondary bus, it is doubtful if the operation would be as satisfactory in case of trouble, for these fuses would isolate an entire block or more. Faults usually burn clear at the location of the trouble and very seldom cause an outage of any magnitude on the secondary system.

The winter peak loads on these circuits vary from 500 to 1,000 kva. Many circuit areas have a ratio of connected transformer capacity to peak load of nearly 1 to 1, while in areas where banking is not practical it is not uncommon for this ratio to reach 4 to 1. The Seattle system has been in operation for over 15 years and has given very satisfactory results.

While this company does not feel that secondary fusing is required in residential and small business areas, its use may be very desirable in business districts of the smaller cities and towns where larger than No. 4 secondary buses are used and where total transformer capacity is not of sufficient magnitude to burn faults clear before cascading takes place. The best system for rural distribution, is felt to be the 6.6/11-kv. star system with grounded neutral. This distribution voltage gives good regulation over long distances at minimum expense for lines and transformers. The question of banking any large number of transformers on these lines without secondary fuse protection has been under discussion for some time, but no decision has been reached.

Two companies have several rural installations (where construction cost must be at a minimum), of 6,900-120-240-volt isolated transformers on branch lines, protected by fuses in the secondary side instead of the primary fuses. A fuse is installed in the primary where the branch line taps the main circuit to protect the four or five transformers connected to the circuit. The hot wires in the secondary side are fused by a tension type of cutout, with universal links of the proper rating for the transformer. This scheme results in a saving of about $15 per transformer installation. The disadvantage is that a transformer failure will interrupt service on the entire line, and the outage may be long because of difficulties in finding the faulty transformer.

One company experimenting with the use of secondary fuses states that when additional transformers are installed on existing branch lines, it is continuing the policy of moving primary fuses to the point where the branch line taps the main line and protecting the individual transformers with secondary fuses. It believes the practice remains sound after two years of experimental secondary fusing of small distribution transformers, during which time the fuses have operated and cleared the circuits properly.

Puget Sound Power & Light Co. has standardized on transformer cutouts of 50- and 100-amp. rating for all distribution and low-voltage supply lines. Those selected are the enclosed-fuse, drop-out type, 50- and 100-amp. rating, for 2.3-kv. delta and 2,300-4,000-volt star circuits; enclosed fuse, drop-out type, 50-amp. rating, for 6.6-kv. delta and 6.6-11-kv. star circuits; open-fuse, drop-out type, 100-amp. rating, for 6.6-kv. delta and 6.6-11-kv. star circuits, and open-fuse, drop-out type, 100-amp. rating for 13.2-kv. delta circuits. These cutouts are all fitted with crossarm clamp and swivel bracket and must be free of radio interference at rated operating voltages.

By networking the primary and secondary neutrals as much as possible throughout the city and by arranging on branch leads to have a ground connection on the neutral on each side of all transformers in addition to the ground connection at the transformer, a positive ground is assured at all times. The present National Electric Code requirement that neutrals on all lighting services be grounded on the premises is a great aid in the prevention of loss of this transformer ground.

West Coast Power Co., which has used a common neutral in two districts for a limited time, believes the advantages are: reduction in original construction cost, feasibility of extensions of secondary circuits in less prosperous communities, and the acquisition of better grounds. Disadvantages are difficulty in replacing transformers and the expense of providing 3-phase service after a single-phase line has been built.

Grays Harbor Railway & Light Co. has used the grounded primary for the secondary neutral without trouble and with material saving in costs. Grounds are installed at the rural substation, at distribution transformers, and at every fifth pole. A common secondary neutral has been used on multiple street lighting, and the primary neutral has been used for return of d.c. when used for operating bridges.

Eastern Oregon Light & Power Co. believes that the small savings in cost are made only at an increase in hazard to life and that investigations of this type should not be pioneered in districts in which it is not absolutely certain that good grounds exist at all times.

From the foregoing, it is evident that the common neutral on distribution circuits is generally satisfactory to the companies employing it, but that each application must be individually studied.

## Discussion

HENRY BERK: We have tried fusing branch lines and eliminated primary fuses of transformers. A good scheme would be some type of thermal protection for transformers with a high rated fuse for the primary of the transformer. This should be made inherent in the transformer so it could not be re-fused in the field but would be taken down to the shop to be examined for trouble.

(On questions asked as to the efficacy of Matthews type fuses—pull links, two companies reported having used these without trouble.)

# ELECTRICAL WEST

*The All-Industry Magazine of Progress*

Established 1887 and Incorporating the "Electrical Journal," "Journal of Electricity, Power & Gas" and "Journal of Electricity"

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## *Industrial Pioneering*

AFTER the Rockies had been crossed a new country west of these mountain barriers developed rapidly. The pioneers who made that first hump spread to all sections of this new frontier and the eleven western states grew in population and in importance. Mines first, next lumber, then agriculture, then processing industries for food and the products of lumber and mines, then oil was found and with it gas, movies found the region favorable and grew to become a great industry, and finally aviation budded and blossomed in the West.

With each industrial develpoment came jobs and opportunities, service industries to supplement the major one, and homes for those who worked at them all. And electricity served them all. As processes developed electricity became not only prime mover but catalyst and refiner. Not only turning motors and lighting lamps, but changing the character of materials and bringing in new processes.

Far more can be developed in these latter phases of electricity. It was to explore a bit into the possibilities for such industrial expansion as well as to review the role of electricity in existing industry, that the Pacific Coast Electrical Assn. dedicated its convention at Pasadena, May 24-26. Appropriately it invited to participate with it in this crusade for more industry for the West those neighboring associations representing the electrical industry in the remaining western states—the Rocky Mountain Electrical League and the Northwest Electric Light & Power Assn.

Prominent in the program were top flight industrial executives from the East, and it was significant that these men originally hailed from the West. A young executive from a young industry whose center is now in the West spoke of the future of aviation when the researches of both electrical and aviation industries find the secret of gravitation and from this knowledge man may be truly freed of his earthbound nature. Even small industry received its share of attention in the thought stimulating "Question Box" talk which was given its preview at this convention. This fall it will be carried to the local meetings of those engaged in the electrical business in all of its branches.

## *A Gage of Public Feeling*

ONE of the industry's chief hopes has been that public opinion would gradually force a more reasonable government attitude toward private industry. As a gage of public feeling the May 19 San Francisco election confirms this hope. The 2.5 to 1 defeat of a $55,000,000 revenue bond issue is encouraging to the industry and should serve as a mandate to the politicians. Particularly is this so because the election was the eighth since 1927 in which municipal distribution was directly or indirectly passed upon by the voters. In this instance, the overwhelming majority against the proposal is impressive on several counts. It was a special election, deliberately set for a Friday. On the ballot was a second measure expected to bring out a heavy favorable labor vote. Added pressure to act favorably on the bond issue came from the suit brought by Secretary Ickes to force cancellation of the present marketing agreement whereby the city realizes a net profit of $2,000,000 annually from the by-product power from its water supply system. Both the California governor and a Congressman actively and personally supported the bonds. In the face of all of this the emphatic "No" expressed by the voters indicates the growing public realization that government has certain specific functions to perform and one of them is not distribution of electricity.

A recess to stretch between speakers. P. M. Downing and Fred Lewis in the front row. At left, inset, President A. E. Hitchner delivering his address of welcome. The head in the foreground is that of W. W. Glosser

¶ Three Western Associations Combine in a Convention to Explore the Possibilities for

# Industrial Development of the West

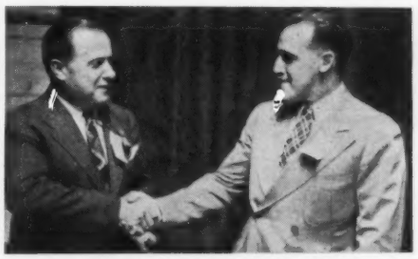
"ELECTRICITY'S Role in the Industrial Development of the West," theme of the PCEA convention at Hotel Huntington, Pasadena, May 24-26, brought out the largest registration in the history of the association—700—and focused interest and attention on the future of the industry in this region. It was a meeting replete with messages of optimism, courage and opportunity. For the first time, representatives of the RMEL and NWEL&PA participated in such a convention, bringing forth the hope that time may see a strong and unified industry organization representative of all 11 states west of the Rockies.

From the opening address of President A. E. Hitchner to the closing moment of the dancing which followed the banquet, there was a correlated mixture of business and entertainment assembled under the capable direction of Westinghouse's H. S. Warren, general convention chairman. Speakers represented a variety of industries as well as all phases of the electrical business. Their messages were vital and were greeted with attendance at sessions which set a new high.

In enunciating the convention theme President Hitchner emphasized that it was not the place of the association to cure the economic and political ills of the country, but to advance the interests of the electrical industry and the customers it serves. He welcomed especially the younger men and expressed the hope that in group meetings their voices would be heard.

Promotion of greater public acceptance of the commodities of the industry is the big job ahead, he said. In furthering this, he reviewed the activities of the PCEA in that respect; the group meetings attended by 2,200 people during the past winter; the meetings with the petroleum industry in Bakersfield and Long Beach.

"We are a friendly group of men and women," he said, "representing a youthful and progressive industry reaching out to, and serving the needs of every human endeavor—an industry founded on sound principles functioning in this Western country, still new and beckoning for our attention with profitable opportunities."



New President Glosser is congratulated by Managing Director Victor Hartley

This thought was carried out by the speakers that followed whose subject matter ran the gamut from electrical conditions elsewhere in this Western region, to opportunities for greater service in a variety of fields. The convention combined the conclave usually held in Fresno, hence two half days were given over to small group sessions that were productive of much worthwhile discussion. The pages that follow contain abstracts of some of the major addresses, reports on others and resumes of the group deliberations, to refresh the memory of those who attended and for the edification of those who could not be present.

## Industrial Frontier

By GEORGE W. MALONE
Consulting Engineer-Manager,
The Industrial West, Inc.

INDUSTRIAL development in the 11 Western states is linked inseparably with the growth of the power industry. Potential and developed low cost electrical energy give this region the lowest priced industrial energy found anywhere in a like area. This power will be a vital force in conquering a new Western frontier—an industrial frontier which has as its basis the utilization of vast stores of raw materials to supply a growing population of 13,000,000 plus the markets of Latin America and the Orient.

Science and invention will be the motivating forces in opening this new frontier, just as they have produced the only real progress that the human race has made in the last 2000 years. M. S. Rukeyser, the economic commentator, has well said that "professional pessimists, who have their innings during depressions, have been exploiting the idea that America's geographical frontiers have disappeared. The fallacy lies in failure to recognize that the creative mind, working in the realm of science and invention, is fast opening up new frontiers." The West is a real frontier in this respect. Its undeveloped natural resources are incalculable; and it possesses certain economic advantages which thus far have been little appreciated and which certainly have not been fully utilized.

For the first time the full scope of this new frontier has been defined. The industrial report being prepared by the Industrial West analyzes the West's major plant factories: raw materials—minerals, agricultural and forest resources; transportation — railways, highways, inland waterways and coast shipping; power—where generated and

the location of transmission lines; markets; trade balance studies for 157 commodities produced or imported; population trends; taxes; climate; water supply and labor resources. This work was done for the specific purpose of determining possibilities for industrial expansion. It was accomplished in close cooperation with the states, the businessmen, industrialists and public utilities of the region, and the departments of the Federal government dealing with such factors.

The power industry has a real stake in seeing that this vast store of information is put to work. The people of this region must be made to realize that the only source of new wealth is through the production and processing of raw materials to the end that there will be more of the world's goods for more people, with a resultant increase in the overall standard of living. Here in the West we must thoroughly explore the field of plant factors affecting industrial expansion, adjust and coordinate such of these factors as it is possible to influence—taxes, tariffs, quotas, power and transportation rates—where necessary, until it is economically feasible to produce goods which we now import or which we might export in a competitive market.

Some examples might be cited: There is a market for 30,000,000 pounds of rayon cord in the tire manufacturing industry of southern California, yet none is produced in the West. There is a large market for newsprint. Our timber resources are the raw materials from which both might be manufactured. Products that might be processed in this area in which power is a substantial factor include ferro-alloys, abrasives, aluminum, copper, electrolytic zinc, magnesium and manganese. All of the raw materials for these are available in the West.

Some of the problems of your industry would be obviated if the emphasis, insofar as the public is concerned, was to be placed upon the beneficial use to which the potential federally produced by-product power is to be put, rather than upon the ownership of such power.

There is another potent reason for the industrial development of this region—national defense. We have a large country, accessible from two oceans. The manufacture of war materials should not be largely concentrated in one geographic area as it is at the present time. Many strategic war materials now imported are available in their raw state here in the West. Factories should be built which would make industrial mobilization for emergency a reality by precluding the drying up of the nation's source of supplies through a concentrated attack on one area.

There is tangible opportunity in the development of the West's industrial frontier. It should be the ambition of industrialists, businessmen, public utilities and administrative officials to awaken an industrial mindedness in the public which will form a springboard for the encouragement of legitimate new industrial enterprises in this region.

## Pacific Northwest

"CONTRARY to the impressions created by some government ownership advocates, the Pacific Northwest is adequately served by interconnected transmission systems and there is no lack of generating capacity or shortage of facilities for emergency or long time interchange of power between systems," LeRoy A. Grettum, president of the Northwest Electric Light & Power Assn., told the convention. Despite great distances and low population densities, cheap and dependable electric service is widely available.

To prove this point Grettum cited statistics on the extension of rural service. Of the 185,000 farms scattered over 250,000 square miles in Oregon, Washington and Idaho, 103,000 or 56% now receive electricity. Only unserved areas are in sections so thin that additional line construction is economically unfeasible. Using his own territory (eastern Oregon) as an example he pointed out that to serve the remaining possible customers would require the construction of 700 miles of line with a customer density of 1.2 per mile. With average annual revenues of $49 per customer, any such program is unsound. Quoting Ex-Governor Martin of Oregon, he stated: "It would be cheaper to buy out the farmers and move them into town to give them electric service, than it would be to take service to them."

Because intensive load building efforts have brought about average domestic usages far in excess of the national figures with concomitant low rates, much of the future load must come from cultivation of industrial possibilities of the region. This would not only create new loads but would improve the overall economy of the Northwest by attracting new population which would provide markets for the present surplus agricultural products. The electrical industry is hopeful, he declared, that the low-cost power from Bonneville will be marketed in such a fashion as to achieve such a goal. He explained how this might come about in a comprehensive review of the Bonneville power project (see page 46).

## Rocky Mountain

BUSINESS generally looks to the electrical industry and its men and women for inspiration, cooperation, assistance and leadership, George E. Lewis, manager, Rocky Mountain Electrical League, Denver, reminded the convention. "In this area and the Rocky Mountain region every branch of the industry has long been a dynamic business-stimulating vehicle. The torch of leadership was not selfishly grabbed; rather it was thrust into the hands of the men and women of the electrical industry, largely in recognition of its succession of dramatically effectives sales promotion rallies, and its defiance of and triumph over the chaos that marked business and industry generally."

That the industry may justifiably regard itself as a potent agency in bringing about nation-wide recovery, if left unfettered; that it has given material assistance to the Federal government in its active work on behalf of the Federal housing movement; that it has been called upon to help trade relations and business development by retail groups; that its executives have been drafted by state and governmental planning boards, by civic organizations, community chest and welfare boards; that many of its members have been selected as "first citizens" of their respective communities, he also reminded the convention.

MALONE GRETTUM LEWIS STONE GROSS

Further reviewing some of the public benefits derived from the public spirited efforts of electrical industry members Lewis spoke of the engineering help its engineers had rendered other industries; the boards and conference groups upon which they have acted; the work on behalf of safety lighting of highways and streets; the reduction of juvenile delinquency resulting from lighted playgrounds; the deeper significance in health and eyesight conservation resulting from the Better Light-Better Sight activity; the enhancement of beauty by its Christmas and garden lighting programs.

He concluded that as in the past there will always be new frontiers for the industry to invade on behalf of itself, its customers and the public generally.

## Flight

INTO altitudes of thought as lofty as those to which his airplanes can ascend Robert E. Gross, president, Lockheed Aircraft Corp., soared too as he forecast the future of aviation if aviation and electrical industries combine their research to solve the problems of gravitation. In a deeply sincere talk, the young executive first reviewed the military status of U. S. aviation, its commercial status, and then projected the convention luncheon group, packed to the doors to hear him on Wednesday noon, into the future of aviation when some means might be found to control the forces of gravitation and truly liberate mankind from remaining the earthbound creature he has always been and make him a free and soaring being. He was introduced by A. L. Stone (Stone Elect. Supply) chairman of the luncheon.

Regretting that so much of the progress of aviation has been fathered by military needs for swift, deadly and maneuverable aircraft, Gross declared that for its own defense problems the U. S. military aircraft knew no superior, that this country had available pursuit, attack and bombing planes designed to meet the tactical problems of defense of the U. S. and that as tactical problems changed, its aircraft would keep step. Pursuit craft with speeds as high as 400 mph. and bombers of 3,000 mile cruising radius and capable of carrying a heavy supply of bombs, and attack planes of high maneuverability were being turned out for the military forces of the nation at a high rate.

Commercial aviation, though, he said, was and will continue to be the backbone of the aviation industry. The development of strong local demand for air transportation and air mail in routine and normal business, has made possible the world supply of American aircraft for the commercial aviation needs of other countries. He paid tribute to the pioneer Douglas, builder of aircraft in the west. He urged a continued public support of air mail by public subsidy as one of the means of keeping alive essential air transport service. For 14 million dollars the nation was getting 50 millions worth of service. He emphasized the non-competitive nature of air transport, that it truly served a special need in transportation not available otherwise.

The electrical industry, Gross was emphatic in declaring, has been indispensable to aviation. From the electric ignition which fires the engines to modern transport planes electrically equipped and controlled, the electrical industry contributes more than 40 services to the airplane.

Ending on the note of research and its tremendous importance to both the electrical and aviation industries he paid high tribute to California Institute of Technology for its research work and its testing facilities which can give airplane manufacturers the answer within a 3% tolerance as to the performance that may be expected from any new design tested. Within the lifetimes of those present, he felt sincerely, the combined research of the two industries should discover some way to counteract the forces of gravity and free mankind of its earthbound nature.

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### HERE LOOKING AT YOU

are conventioners from everywhere. From top to bottom and left to right you see:

1. Representing the three associations, George Lewis, managing director, RMEL, Denver; A. E. Hitchner, president of PCEA, Los Angeles; and LeRoy A. Grettum, president of NWEL&P, Baker, Ore.

2. Dave Harris, vice president, General Electric Supply Corp., San Francisco; P. M. Downing, vice president and general manager, P. G. and E., San Francisco, and Al. Morairty, vice president, Central Arizona Light & Power, Phoenix

3. O. R. Doerr, general sales manager, P. G. and E., San Francisco; Davis de Bard, Stone & Webster, New York City, and from the opposite coast line, J. W. Coons, division manager, P. G. and E., Eureka

4. A couple of hard workers—Howard Hayes, So. Cal. Edison assistant advertising manager, who handled newspaper reporters, and H. S. "Skip" Warren, general convention chairman

5. Just a couple of Red Seal wheelhorses, Victor W. Hartley, managing director of PCEA and PCEB, and Carl Heise, Westinghouse, chairman of the Red Seal committee

6. From San Francisco came George W. Barker, newly appointed manager of the Pacific Coast Electrical Bureau, Northern California division, and Kenneth Ryals, president of the Electrical Contractors Assn. of Northern California

7. Just two happy G. E. men—Lloyd "Tick" Wilson, of the Incandescent Lamp Division, and Eddie Ellis, of G. E. Co., Los Angeles

Typical of the many committee meetings was this one of the Air Conditioning committee, over which H. H. Douglas of So. Cal. Edison presided

# Operating Economics Section Studies Human Engineering

HUMAN as well as physical engineering occupied the attention of the Operating Economics Section. Highlight of the deliberations conducted under section chairman J. F. Davenport (So. Cal. Ed.) was a report presented by a committee headed by F. R. George (P. G. and E.) dealing with occupational segregation and improvement of employees.

For comparative purposes the report details specifications of the duties, responsibilities and working conditions, excluding salaries and wages, pertinent to the definition of job classifications for outside operating employees of all member companies. It then investigates and tabulates the programs of training or apprenticeship for securing greater efficiency in the position held or for advancement. Revealed was a great inconsistency of job classification and wide and controversial differences as to practice, methods, effectiveness and policy of training.

A second matter of general interest was the revision and simplification of G. O. 64 of the California Railroad Commission governing line construction. Following 10 years of operation under the old orders, a revision is under way which will take advantage of changes and improvements in the art to maintain high standards of safety. A committee under S. J. Lisberger (P. G. and E.) has been conducting studies since August, 1938 on both the supply line and communication phases of the subject and the initial draft of the revisions is being made. It will be approximately nine months before the first public hearings on the subject.

In addition to a general session at which these matters were considered, there were group meetings on the following specific subjects:

Production and substation engineers analyzed and discussed two vital problems—methods of decreasing maintenance costs and the grounding of neutrals on rotating equipment. Under the direction of H. A. Lott (So. Cal. Ed.), discussion leader, new ideas were advanced on the first subject and a controversy developed on the second.

E. A. Crellin (P. G. and E.) in pointing up the subject of maintenance, declared that there is no substitute for maintenance in economical system operation. Among suggested techniques which he outlined were the application of welding and metal spraying to hydraulic turbine buckets, blades and nozzles; care in layout and design which would expedite teardown and reassembly of large machines; periodic re-wedging of generator coils; reversing collector ring leads to reduce and equalize wear; systematic removal of scale from water cooled transformer coils; frequent inspection of bushings and the use of portable silver plating equipment for contacts. H. A. Noble (San Diego Con. G. & E.) suggested cement washes and sprays for furnace interiors in steam plants; application of protective coatings to boiler interiors and the use of welded construction in piping modernization. C. P. Rhine (San Joaquin) recommended painting of metal hydraulic works to reduce the corrosive action of tannic acid in water stored in reservoirs and the use of a new metal, "Sil-Phos," on turbine runners to raise unit efficiencies.

J. H. Vivian (So. Cal. Ed.) presented a comprehensive study of grounding of neutrals in rotating equipment based upon calculations for equipment on his company's system which included the recommendation that machines which are Y-connected have the neutral lifted and ground detectors installed. He described the effects obtained and equipment necessary for three-potential and single-potential ground detector installations. A. W. Copley (Westinghouse) urged that care be used and studies be made before totally discarding the practice of grounding neutrals. C. E. Schnell (San Joaquin) pointed out that the practice on his company's system was not consistent, although a test installation of single-potential detectors had been made. Prepared discussion by E. H. Banker (G-E) emphasized that the practice was dependent upon operating conditions. A. F. Ayres (Nev-Cal) cited experience with a three-potential ground detector system, including lightning arresters, on a Hoover Dam unit. F. S. Benson (P. G. and E.) stated that all major hydro units on P. G. and E. lines were being converted to elevated neutral.

Meter test periods and sequence metering featured the discussions of the meter group under the leadership of W. H. Lindblad (P. G. and E.). Because the California Railroad Commission is conducting field tests to determine the advisability of establishing definite test periods and accuracy limits, a paper on this subject by N. H. Beebe (So. Cal. Ed.) provoked considerable discussion. He showed how average accuracy increased with shorter test periods and how public relations were improved. It was agreed that more information was needed on the subject.

Operating Economics Section Vice Chairman, Allan Jones, of General Electric, San Francisco, and Chairman J. F. Davenport, So. Cal. Edison, Los Angeles

W. H. Talbott (San Diego Con. G. & E.) described current practice in changing over to sequence metering including the method of charging off the cost — materials including new meters charged to capital, labor of removing old meters to depreciation reserve and the rewiring to meter service account. His remarks aroused considerable dis-

cussion over the relative merits of socket type versus the A B and C types of meters.

An interesting test technique used in the Pacific Northwest was described. This consists of a truck equipped with testing apparatus which is taken into the field, where meters are brought to the truck for testing and then returned to the customer's premises. Relative advantages of ball and pivot type bearings were discussed as was the advisability of eliminating the 5-amp. meter in favor of the 15-amp. unit. Criticism was voiced of the standardization of dial constants established by the EEI meter committee, particularly the constant of 10 applied to 50-amp., 220-volt single-phase meters and 15-amp. 240-volt two-element meters.

Distribution and transmission engineers considered the coordination and protection of 4-kv. circuits, including multi-grounding, single grounding, grounding through a transformer and the communication problems arising from grounding. John Madden (P. G. and E.) lead the discussion which revolved around the advantages and disadvantages of different grounding systems, including the problems of relaying involved. Cited as a new phase of an old problem of grounding was the use of capacitors which induce a large component of fifth harmonic.

Lloyd Hunt (So. Cal. Ed.) gave a brief summary of phase-to-ground fault tests of his company's Hoover Dam transmission line in connection with relaying. Protection of 3-phase branch circuits by means of fuses as against circuit breakers was discussed.

Some of the commercial men—David de Bard of Stone and Webster, New York, with back turned; W. E. Cranston, Jr., Thermador, Los Angeles, vice chairman of the Business Development Section, and Bob McFadden, So. Cal. Edison Co., Los Angeles

Citing the voluminous report of the EEI-Bell system joint committee on the joint use of poles with higher distribution voltages as a basis for evaluating the economics and hazards of this type of construction, Madden pointed to this field as one meriting serious study. Stanley Rapp and Mark Sawyer (Pac. T. & T.) emphasized the difficulties of applying proper protection to this type of construction but agreed that the practice is feasible and, within certain limits, less hazardous than joint occupancy at lower voltages. Protection with reclosing fuses as opposed to reclosing circuit breakers was advanced as one solution to the problem.

Significant was the fact that virtually all subject matter discussed dealt with means of promoting more economical system operation or more reliable service at less investment cost.

# Business Development Section Hears of Nebraska Failures

NEBRASKA'S costly and disappointing experience with its public power developments were told in analytical detail to the final general assembly of the Business Development Section by E. G. Stahl (San Joaquin Power) on Thursday morning. Returning from a recent trip east Stahl stopped over to investigate the experience of Nebraska in a widely heralded public power program because of possible similarity to what may transpire in respect to the Central Valley Project in California.

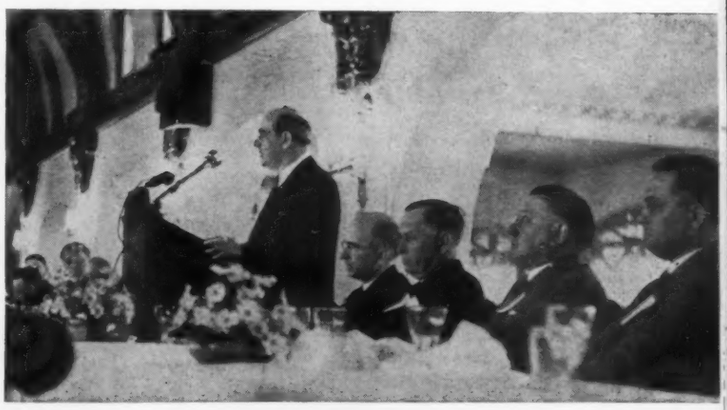
Whereas the engineering on other big government power projects has been sound, on the Nebraska projects it has been so poor as to cause failures in canal systems, flooding of lands, and destruction of fertility by alkali. One project, Stahl reported, can scarcely develop enough power to run the dredges which try vainly to pump away the heavy silt deposits.

The Business Development Section meeting was presided over by Vice Chairman W. E. Cranston, jr., in the absence of R. J. Holterman, chairman. The Thursday morning meeting brought together the entire section after the previous afternoon's committee meetings. It was first addressed by Wm. P. Bear, (P.G. and E.) who read and discussed his paper, "The Cost of Light from Modern Sources," published in Electrical West, May, 1939, p. (47).

Demand and Diversity Factors, and Red Seal Ordinance committees, under Chairman C. E. Heise, (Westinghouse) concerned themselves with wiring problems. The value of a study of demand and diversity factors on residential meters was discussed at some length. After such discussion it was decided to submit a recommendation to the directors that a study of residential demands and diversity be made and to make a cost estimate of such a survey. The Red Seal and Ordinance committee reviewed the present Red Seal Adequate Wiring specifications and then discussed ordinances and the possibility of changing existing ordinances to allow installation of wiring systems permitted by the National Electrical Code in order to promote a more extensive development of home wiring.

The Industrial Power and Heating and Industrial Power Handbook revision committees also met jointly, under chairman G. N. Hawley, (So. Cal. Ed.) After a discussion of the various problems in connection with the sale of commercial cooking equipment it was decided that this was too specialized a field to warrant a committee to study the problem from the standpoint of the association as a whole. It was recommended that a separate committee be appointed to study the problem of establishing a uniform method of rating welders, X-ray machines and similar equipment in terms of horsepower to conform to power company rate schedules. Competitive power problems were discussed at length and a further study will be made of this subject.

A. L. Laws presided over the handbook revision committee session. Subjects to be



When Bernard F. Weadock of Edison Electric Institute addressed the Thursday noon luncheon PCEA directors and notables filled the head table. Next to Weadock is Fred Lewis, general manager, So. Cal Edison; N. G. Symonds, Westinghouse; R. M. Alvord, General Electric Co., and Harry Fogwell, Thermador

A. D. Church, chairman of the Administrative Services Section and Mrs. Church

E. G. Stahl, of San Joaquin, who told of Nebraska's leaky dams

# Administrative Services Section Debates on Depreciation

IN that group of utility services directed chiefly to the company yet dealing so intimately with the public—credit, collections, accounts, transportation and customer relations—come some of the most delicate human problems related to the industry. Under chairman A. D. Church (San Joaquin Power) the Administrative Services Section has spent the year studying just such delicate yet important company matters. At the conclave the committees met to check this year's accomplishment and to decide what work still must be carried on—because new future customers continue to be born every minute.

A Customer Relations Audit committee questioned all of the member companies as to what they do in the way of making regular checks of customer reaction. E. A. Long, (P. G. and E.) headed this committee. In making its own audit of customer relations audits this committee decided it would be desirable to exchange data as to the methods, costs, and results of various types of customer sampling. Such an interchange should improve the methods and results for all.

Calling in to sit with them transportation men from the other large fleet operators, such as oil companies, gas utilities, transportation companies, etc., the Transportation committee, headed by E. C. Wood, (P. G. and E.) continued its discussions late into the evening Wednesday. Company owned versus rental equipment—cars owned by employees and used in company business—provided lively discussion and divergent opinion. The question of insurance where salesmen are required to have a car when they are hired, and the fact that they become agents of the company in the eyes of the law, evoked much opinion. This subject was suggested as needing further study next year. Particularly the accident phase of the problem and whether the company should or should not service such private mechanical equipment in the same manner it does its own, needs further study. Then too there is the problem of whether drivers should not be examined periodically.

Whether maintenance of company equipment should be centralized or decentralized was a hotly argued question. The importance of the problem and the strong opinions held in respect to it brought the recommendation that since this question seems to be affected by changes that seem to be taking place in policy in these respects, studies should be made to determine the most efficient, most economical thing to do for the company. A paper on depreciation—when to replace automotive equipment most economically—brought into the discussion several interested auditors.

Credits and Collections came in for discussion under the chairmanship of Charles Davies, (San Diego Cons. G. & E.) In these meetings were talked over; uniformity of customer deposits, cooperation between companies on follow-up collection of delinquency accounts, the exchange of credit information, shut-off policy and procedure, and reconnection charges, merchandise accounts—how passed on and handled, and time payment contracts.

In the Accounting Group, with F. C. McLaughlin, (So. Cal. Ed.) presiding, depreciation was the topic of the hour. J. T. Ryan, (P. G. and E.) presented an excellent paper on the subject of theories for computing depreciation reserves. A growing need for contact between engineers and accountants to arrive at more satisfactory handling of depreciation problems was felt and such contact was recommended by this group. The interrelation of engineering, accounting and taxation to arrive at satisfactory depreciation reserves was recognized and further activity along the same line was recommended for next year.

included in the handbook were outlined, together with the style to be used in its preparation. The handbook will consist primarily of factual data, it was agreed.

Highway lighting attracted to the meeting of this committee, under chairman R. E. Fisher, (P. G. and E.) and subcommittee chairman W. P. Bear, (P. G. and E.), many of the chief executives of the industry to join in its discussions. After considerable comment on the political and human problems in connection with obtaining accurate information respecting accidents on much travelled highways, it was decided to set up round table contact with engineers of the state highway commission for further exploration of the common problems of lighting and safety. Last year the committees studied the types of highway lighting specifically adaptable to the various kinds, widths, and characteristics of roadways; it studied rates with a view toward standardization of rates for highway lighting over the entire state; and it studied the operating costs per mile for the different types and systems of lighting for highways.

Air Conditioning Committee, under chairman H. H. Douglas, (So. Cal. Ed.) reviewed the chief contribution made by this committee to the air conditioning industry during the past year, namely its compilation of accurate weather data from typical regions of the state as a basis for establishing the proper elements of design of air conditioning systems in various localities with differing weather problems. It was decided to find out from actual operating agencies in the air conditioning field what data are needed and in what form it should be prepared to further aid this industry.

Evaporative coolers were also discussed and their value as a load to the utility debated. The effect of adding large numbers of small motors of the type used to existing facilities was discussed, and the high rate revenue derived from such load appreciated. It was generally agreed that evaporative coolers are a stepping stone to the proper air conditioning of homes which will follow in the future.

Petroleum Electrification Committee, under J. P. Kastl, (So. Cal. Ed.) chairman, decided that there was much to be gained both by oil men and utilities meeting together in committees. Further efforts will be made to interest more oil men in the association and to ask them to join and participate in its activities. An effort will be made to assemble data as to electrical applications in the oil industry, compile them and distribute them both to the oil and electric industries. Four major oil companies were represented by attendance at this meeting.

Sales Training Committee, under W. A. Cyr, (Electrical West) having completed its survey, (See page 57) held no meeting.

## The Industry Today

By B. F. WEADOCK
Vice-president and Managing Director, Edison Electric Institute

SINCE 1933 the electric utilities have been sailing on uncharted seas. The familiar buoys and lighthouses have been changed or dimmed. The old navigation charts have been discarded. Yet the confidence, patience, integrity and ingenuity of utility managements have brought the ship past all obstacles and shoals.

Warm weather made an outdoor committee meeting preferable—I. H. Lecklider, Jim Moulton, N. R. Sutherland, Lloyd Henley, B. B. Beckett, C. L. Ashley

Col. Stanford
(See page 53)

Dr. Krick

The public should give the industry credit for this successful navigation job.

Statistics for last year prove how well we have fared. The number of customers increased by 678,484, the use of electrical energy by 6.6%. Average domestic consumption reached 845 kw.-hr. Each class of service showed increases in use, except industrial, which fell off 16.1%—farm use of power rose 5.8%, the homes of America used 9.8% more and commercial and small power customers increased their consumption 4.3%. With all of this, and rate reductions besides, the gross revenue of the utilities decreased only 0.6%.

This was accomplished in the face of a tax increase of more than $10,000,000. Today the electric utilities are contributing to the cost of government at the rate of $1,000,000 per day. I wonder how many people in this industry and among the public generally appreciate that a 4% reduction in the cost of government would equal the entire domestic electric bill for the nation? And they say that the cost of electricity is a public issue!

Our industry still has its problems, most of which are not new. One of these is municipal ownership, which has had a new stimulus since the Federal government reversed its power policy in 1933. Since that time the government has contributed $192,000,000 to 470 municipal ownership projects, none of which aided unemployment or stimulated recovery. However, I think the public attitude is changing. Witness the trend in public voting on municipal ownership since 1933 when the total favorable vote in all elections was 70.5%: 1934, 63.3%; 1935, 55.8%; 1936, 27.4%; 1937, 11.4% and 1938, 36.1%. This latter figure was influenced by two major elections which were a large percentage of the total.

A second problem is government ownership. How many people realize that only three Federal power projects were initiated by Congressional action—Hoover Dam, Wilson Dam and the TVA? The remainder have been started by executive order. Passamaquoddy never saw the light of legislative halls; if it had it would have been condemned for the wasteful undertaking that it turned out to be.

The day of punitive action against the power industry is passing. The public, which in the end, is the final judge is showing its faith in our accomplishments. Our industry has seen darker days than those which it has just gone through, and it has come out stronger and more virile. Due to its essential character it has been classed by economists as depression proof. We have evidence now that it is both depression proof and oppression proof. We will continue to carry on in the face of all obstacles to the end that the public shall receive the best service at the lowest possible cost.

# Quiz for Business

"THE Question Box" will succeed the cash register story, "What does it mean to me?" on the program of the series of educational meetings that PCEA will hold this fall. And to the convention a preview of that lantern slide illustrated talk was given at the beginning of the Thursday afternoon general session, over which Clyde Huston, (So.Cal.Ed.) vice president, presided. Richard E. Smith, (So.Cal.Ed.) chairman of the Industry Information Committee, and author of both last year's and the new script, introduced the preview by summarizing the purpose and accomplishment of the committee during the past year.

Ten regional meetings were held in Visalia, Riverside, Sacramento, Santa Rosa, San Jose, Santa Cruz, Santa Barbara, El Centro, San Diego and Reno and placed the program before 2,265 people in the industry. The first address in each instance was by a prominent utility executive on the subject, "What is the electrical industry?" printed in ELECTRICAL WEST, and reprinted so that 20,000 copies shall be distributed to the rank and file employees of all groups in the industry in California and Nevada. The second address, "What does it mean to me?" told of the business opportunities awaiting cultivation in any town. It is for a similar purpose that the "Question Box" talk will be given this year.

It is planned, Smith explained, to hold all meetings this year between the end of vacation period and Thanksgiving. The theme will be that of talking or questioning the little local industries in any town as to the possibilities for electrical modernization.

Graham Holabird, (Nat. Elect. Prod. Co.) president of the Electrical Development League of So. Calif., was then asked to present the talk as it is planned that it be given this fall in the new series of meetings.

"This is the story of electrical modernization and the part you can play in it. . . . You will hear a lot about your own neighbors in the town where you live and the little local industries that support them," the illustrated talk begins, and then sets about by the use of questions to stimulate thinking, reveal the possibilities, and to stimulate those in the electrical industry to ask some questions of these neighbors that may lead the latter to want more electrical equipment.

During the course of a concentrated 30-min. illustrated talk a wealth of stimulating prospects are suggested by the questioning of the speaker. Each local business—garage, print shop, etc.—is explored for its business possibilities. Processes and inexpensive electrical facilities are suggested for all manner of small local businesses. New products, such as the splash-proof motor, circuit breaker, infra-red lamp, oil-less transformer, are described briefly, enough to stimulate further inquiry as to their potentialities.

Most surprising reaction to the demonstrated talk was that it took only 30 minutes to cover so much ground, to open up so many possibilities for business, and to suggest that the easy method of using good questions was the best to initiate action and cash in on the possibilities for business thus started.

# Electrified Industry

By E. O. SHREVE
Vice-president, General Electric Co.

TREMENDOUS progress has been made toward increasing the standard of living in this country and every industry has contributed. Yet, as we analyze the advance that has been made, we see that in practically every instance electricity and electrical de-

General Electric's E. O. Shreve

Westinghouse's N. G. Symonds

H. L. Doolittle and light beams

velopments have played an outstanding part. Its part has made possible increased quality of product which greatly reduced cost, creating opportunity for wider markets and greater employment in many industries.

Let us look at a few. Consider aluminum—the price of this essential metal has been reduced from $8 to 20 cents per pound due to electrolytic refining. The contributions of the electrical industry to the manufacture of steel have so broadened the market that the steel companies employ 500,000 people today where they employed only 275,000 in 1907. In the automotive industry electricity has been a major factor in reducing the cost of cars 30% from 1925 to 1938. The man hours required to produce a car have been reduced from 230 to 195 in the same period. In the petroleum industry use of modern electrical equipment and control has promoted safety and contributed to the reduction in the price of gasoline. In textiles, in paper, in agriculture and in virtually every other industry the story is the same—electricity has played a prominent role in bringing greater employment and much more enjoyment and comfort to the American people.

(Editor's Note: So much valuable basic information was presented in Mr. Shreve's address that it will be published in full in the next issue.)

# Weather Forecasting

## Has Advantages for Many Industries in Gaging Operations

ADVANTAGES accruing to industries of all types through long range weather forecasting were presented by Dr. Irving P. Krick, associate professor of meteorology, California Institute of Technology, in a discussion and demonstration of the newest technique and theory in predicting weather conditions. Dr. Krick's forecasts are based upon the study of temperature, pressure, humidity and direction of flow of the upper air currents which are now available over a wide range of territory due to the complete weather reporting necessary for civil aviation.

Observations are obtained at altitudes in excess of ten miles through the use of a 2-oz. automatic radio transmitter connected to pressure, temperature and humidity recording apparatus and operated by an 8-oz. lead acid battery. This equipment is sent aloft attached to a hydrogen-filled balloon. He demonstrated through lantern slides and motion pictures how these data are correlated and plotted to indicate boundaries between polar and tropical air currents where storms occur. His motion pictures showed both cloud formation and air currents movements vividly, having been taken at intervals of two seconds per frame.

Among the uses made of such long range forecasting is in the aviation industry where predictions can be made of depths of clouds, upper air temperature, icing conditions, probability of fog and likelihood of smooth air, all of which are essential to the comfort and safety of passengers. Air weather reporting service is now 95% accurate, he declared. In the motion picture industry, outdoor production schedules are based upon weather forecasts so as to eliminate costly delays and payment for extras who are not used. The Los Angeles County Flood Control District uses the forecasts to regulate water levels in storage reservoirs.

In the utility field gas companies gage fuel demands for three or four days ahead upon forecasts of weather and temperature. In the southern California flood of March, 1938, the utilities were given a two-day warning of approaching record precipitation and thus were able to have gas holders full in case of breaks in pipelines.

Electric utilities are now using such forecasts to anticipate ice formation on distribution lines and to gage load demands depending upon whether the weather will be clear or cloudy. He cited an instance in March of this year when the Detroit Edison Co. was given a two-day notice of impending glaze ice conditions and a 12-hour notice of the exact areas in which glazing might occur. The storm hit on a Sunday morning and line crews were mobilized and waiting to repair fallen lines and restore service. Lightning predictions are also possible. The forecasts are relayed via teletype.

# Polarized Light

VERSATILE are the interests of H. L. Doolittle, chief engineer, So. Cal. Edison. Among them is a hobby for polarized light, for exploring the rich pure colors into which crystalline substances break light rays that have previously been put through the sieve of polarizing crystals such as nickle salts, iceland spar, or the quinine salts used in the recently developed Polaroid. Describing himself as the comedy relief on a serious program, Engineer Doolittle proved his sense of humor in his casual introductory remarks.

Conscious of the practical mindedness of the industry, he spoke first of some of the possible uses of polarized light, such as for the control of auto headlight beams and elimination of glare. To illustrate what happens to light when it is polarized he brought forth a tangled mass of wiggley colored wires representing the color waves in a beam of white light. By sifting and sorting or combing the light waves, he demonstrated, only the light rays in a single plane are permitted to pass polarizing substances. With these practical excuses for his demonstration disposed of he then projected on the screen beautiful crystal formations and by revolving them in the projector and bending the light beams passing through and reflecting from them, he produced spectacular color changes and forms.

With apparatus he had constructed himself he entertained the convention for some minutes, ending by projecting light through materials that crystalized while they were being shown, and producing a fascinating and surprising color pattern creation of infinite variety.

# Tomorrow's Problems

By N. G. SYMONDS
Vice-president, Westinghouse Elec. & Mfg. Co.

CLOSE cooperation between the utilities and the manufacturers has enabled the industry to proceed at an incredible speed in meeting the needs of the public. This has permitted the meeting of demands for lower costs, greater safety, wider range of transmission, more appliances and apparatus to use energy, and through all these necessities, a better and readier

acceptance of all things electrical on the part of the public.

New conditions are presenting new problems to be solved cooperatively. The National Electrical Code is one. Delays and misunderstandings of the relative positions of the utilities and the manufacturers in dealing with the NEC are and must be reconciled. Uniform ordinances is another. The utilities must recognize their local necessities, but they should remember that the manufacturer cannot produce consumer goods at low price unless he can manufacture a uniform product and standardize its use and acceptance. Ill-advised legislation is also a problem, in which the interests are mutual. Perhaps all branches of the industry can work together in the analysis of each law presented and constantly be on guard for the industry as a whole. In this way we can do a better job for ourselves and for the public.

A challenge to the utility and manufacturer alike is the 30 to 35% of the homes which are now served at a definite loss to the power companies. These homes provide a large market for the manufacturer. We have a mutual responsibility for eliminating these profitless services. Another mutual opportunity for all of the industry exists in convincing the public that the electric utilities are sound, so that they can do a fair amount of equity financing. The resultant expenditures for expansion and extension would benefit the entire industry and have a far-reaching effect on the welfare of the country.

Still another opportunity for cooperation and study is in the budgeting of capital goods orders in the valleys and not on the peaks, leaving idle machinery and manpower when the peak has passed. There is no more certain and desirable way by which recurring declines in the business cycle can be reduced, and to achieve the much talked about "sustained prosperity," than to encourage and develop long term planning for capital expenditures.

A final matter that needs cooperative handling on the part of the whole industry, if we are to share properly in the housing plans of the nation, is a united stand to present the merits and necessities of our business to the various bureaus at Washington. Today the gas industry puts up a united front in Washington and too many projects are going through with a maximum of gas equipment and minimum of electrical.

We must work as a united industry. Our common problems must be solved by those who are familiar with all their aspects and implications. They must be solved fairly to the industry as a whole and to the public that we all serve.

Congratulations to the new president, Wally Glosser, center, from George Tenney, Ray Alvord, Fred Lewis, and retiring president A. E. Hitchner

# Annual Meeting

IF it is unique in nothing else, PCEA is distinctive in having a treasurer whose report is amusing while it still remains factual. At the close of the convention the business session of the association was called by President Hitchner. Usually routine, the session was enlivened by the good natured way in which Treasurer N. R. Sutherland, (P. G. and E.) told "where the money came from, where it goes, and what's left—if any."

Managing Director and Secretary Victor W. Hartley made his report equally brief, reviewing some of the association's accomplishments for the year and announcing the present membership as 2,613, representing all branches of the industry. He spoke of the handbooks of the agricultural power and the industrial power committees, soon to be published, the PCEA participation at the agricultural summer school course at San Luis Obispo, the climatalogical data gathered by the air conditioning committee, the petroleum industry meetings, the model school room lighting demonstration kit made available to utilities and its use in school demonstrations, the P.C.E. Bureau activities for uniform codes and Red Seal Adequate Wiring.

Reporting for the norminating committee consisting of A. H. Markwart, chairman, F. E. Boyd, A. D. Brown, H. D. Conklin, A. E. Holloway, W. R. Marshall, and A. H. Nicoll, he submitted the report, nominating for president and directors: President—W. W. Glosser, Hubbard & Co., Emeryville; Directors—Albert Cage, Nevada California Electric Corp., Riverside; J. M. Crilly, General Cable Corp., San Francisco; H. H. Fogwell, Thermador Electrical Mfg. Co., Los Angeles; S. E. Gates, General Electric Co., Los Angeles; D. E. Harris, General Electric Supply Co., San Francisco; C. E. Houston, Southern California Edison Co., Los Angeles; A. F. Morairty, Central Arizona Light & Power Co., Phoenix; K. M. Ryals, Stone-Ryals Electric & Mfg. Co., San Francisco; N. R. Sutherland, Pacific Gas and Electric Co., San Francisco, all of whom were unanimously elected.

# Divertisment

ENTERTAINMENT at the convention was chiefly educational and in some of its innovations, surprisingly different, especially in the women's entertainment. For the two evenings, Wednesday and Thursday, interesting and educational sound movies were shown to convention audiences of men and women. "Steel—Man's Servant," technicolor moving picture dramatizing the steel industry, was shown through the courtesy of Columbia Steel on Wednesday evening. "A Hurricane's Challenge," a dramatic and excellent public relations moving picture of telephone linemen restoring service in storms, was shown through the courtesy of the Southern California Telephone Co. on Thursday evening. On Friday evening was held the annual banquet, devoid of speeches and characterized by an excellent floor show.

Preceding the banquet the manufacturer, manufacturer's agent and wholesaler members of the association were hosts to all at a cocktail party, colorfully arranged.

Ladies' entertainment was highlighted by a surprise contest on Wednesday afternoon that probably was more entertaining to the men who lined the balcony than to the ladies. For a prize the ladies waded into the outdoor swimming pool as far as possible without dampening their dresses. Another novel entertainment for the ladies was provided after an outdoor luncheon Friday at the swimming pool. A quiz contest, similar to those so popular on the radio was conducted. Another event of unusual interest was a make-up demonstration, "Glamour, and Grooming the American Woman," by A. B. Shore, director of make-up of Max Factor's Studios, Hollywood. Bridge, a sightseeing tour, and other informal entertainment was offered during the convention.

Chairman of the ladies' entertainment committee was R. E. Fisher (P.G. and E.) ;of the hostess committee, Mrs. Fisher. Of the banquet committee, J. A. Long, (So.Cal.Ed) was chairman; of the greetings committee, Roy N. Phelan, (McGraw-Hill) ; of golf, J. E. Crilly, (Gen. Cable) ; and of registration, Stanley W. Scarfe, (G.E.) ; of advertising and publicity, F. M. Raymond (S.D. Cons. G.&E.).

H. S. Warren, (Westinghouse), general convention chairman, with B. D. Haugh, and Leon S. Heseman (So.Cal. Ed.) assisting handled the multitude of details expeditiously and smoothly.

# Contractors

## Organize State Group in Washington; Other News

Nearly 100 electrical contractors from all sections of Washington, met in Yakima May 5, selected temporary officers for a state-wide organization, and approved an executive committee to work out further details.

Because of a rapidly growing significance of the state's power production, which is bringing forth numerous problems of primary importance to the contracting fraternity, leaders in Washington industry believe that the time is ripe to coordinate efforts to market this power.

Temporary officers selected are: F. L. Van Slyke, Puyallup, president; G. G. Picatti, Yakima, vice-president, and Burt Raymond, Tacoma, secretary-treasurer.

Sam G. Hepler, Seattle, heads the executive committee. Other members are: G. G. Picatti, F. E. Smallidge, Wenatchee; G. F. Fauver, Everett; P. H. LaRiviere, Longview; Byron Byrne, Sedro-Woolley; F. Post, Olympia and T. J. Bell, LaCrosse.

The next meeting is scheduled for June 10, when the executive committee will offer a suggested constitution and by-laws for the new organization.

Despite a mock "suicide" and murder, the Vancouver Electrical Assn., contractors organization, elected new officers at its annual banquet and meeting last month. J. Homersham, a member of the executive board for several years and vice president last year, was selected as president; Earl Dunsmuir, former chairman of the social and recreation committee, as vice president.

G. W. Firth, former editor of *The Electric Eye*, official organ of the association, was named treasurer. S. F. Ricketts was reelected secretary.

W. C. Mainwaring, general sales manager, B. C. Electric Railway Co., Alderman H. D. Wilson, Thomas Martin, city electrician, and R. Hall, secretary, Electrical Service League of B. C. were the speakers. The meeting was well attended by all branches of the industry.

# Inspectors

## Preview of convention trip to Fair, also chapter activities

Very short indeed was the business meeting of the Northern California Chapter, International Assn. of Electrical Inspectors, held at the P. G. & E. theater at Treasure Island, May 6. New chairman Ben Hill announced the appointment of George Kimball, electrical engineer, Industrial Accident Commission, to succeed the late Carl Hardy on the IAEI executive council and also to become 2nd vice-president of IAEI in the place of Carl Hardy.

Secretary Harold Gerber then directed the meeting to the lounge of the Westinghouse exhibit, where Ben Hill, Ralph Wiley, Harold Gerber and George Kimball talked to the group by television from the RCA exhibit studio. A visit then to the Westinghouse, RCA, and the "House of Magic" of General Electric Co. completed the meeting. Next chapter meeting will be deferred until September in Oakland, after the Southwestern and Northwestern Section joint convention in San Francisco Aug. 14-17.

TRENDS in wiring practice were discussed in Seattle on May 11 by Arthur E. Schanuel, field representative of the National Adequate Wiring Bureau, who spoke before a dinner meeting sponsored jointly by Puget Sound Chapter, International Assn. of Electrical Inspectors, and the Seattle Adequate Wiring Bureau.

Nearly 100 attended the affair, held at the Frye Hotel. Because of its unusual sponsorship—the first of its kind to be held—inspectors from principal western Washington cities were enabled to meet with representative industry men on a face-to-face basis.

Norman O'Farrell, General Electric, was an additional speaker, discussing fluorescent lighting.

In prominent spots at the gathering were Chester M. Kirsop, chief electrical inspector, Olympia, Washington, and president of the Northwestern Section, IAEI; William Gaffney, chief inspector, Tacoma, president of the Puget Sound Chapter, IAEI; E. E. Lee, electrical inspector, Seattle, dinner arrangement chairman, and R. D. Horning, chairman of the adequate wiring committee of the Electric Club of Washington.

NEWLY FORMED Imperial Valley Chapter of the Southwestern Section IAEI was granted its chapter, Mar. 21, at Brawley. Officers had already been elected as follows: chairman, W. A. Axemaker, Brawley; secretary-treasurer, A. J. Boles, El Centro. Associate member on the executive committee is H. L. Bush. Chapter meetings are to be held on the second Tuesday in January, March, May, September and November. A uniform code in the valley is felt to be necessary and the Uniform Electrical Code of the Pacific Coast Electrical Bureau is being studied by a committee with a view to its general adoption.

# Meetings

San Francisco Pot & Kettle Club—Annual convention will be held at Hotel Claremont, Berkeley, July 7-9.

East Bay Electric Club—Guest speaker at April 24 luncheon in Oakland was Arthur J. Kercher, vice-president, Wesix Electric Heater Co. Kercher spoke on "The Central Valley Project and How It Can Be Made to Pay For Itself." Ed Touraine was chairman for the day. Al Fragley is president of the club, Dave Kilgour, secretary-treasurer.

Electrical League of Utah—Held three meetings in May in Salt Lake, Ogden and Provo, for purpose of discussing adequate wiring. Dr. G. W. Allison spoke at the Newhouse Hotel, Salt Lake, May 25th, and in Ogden, May 26.

Electrical Contractors & Dealers Assn. of San Joaquin County—Met in April, 218 Elks Bldg., Stockton, where regular meetings are held, 2nd Monday of each month.

Southern California Chapter, IAEI—Met at Long Beach, May 24, to discuss inspector problem.

Santa Barbara Chapter, NECA—Met April and May at a business meeting and dinner meeting to attend to chapter business and hear report on state convention, attended by C. W. Smith, J. W. Baldwin. Business and dinner meetings scheduled for June, former second Thursday of month, latter, fourth Thursday. Bid depository will be discussed.

Electric Club of Washington, Seattle Chapter—On April 24, Norm O'Farrell, General Electric Co. illuminating engineer, spoke on "Developments in Interior Lighting." At the next regular Monday meeting, May 8, Lieut. G. H. Hasselman, Operations Officer, U. S. Naval Air Base, Sand Point, Wash., showed a motion picture just released by the Navy Department, entitled "The Gray Armada." Arthur Schanuel, field representative NAWB, presented the latest information on this program. May 15, Charles Frisbie, General Agent, New England Mutual Insurance Co. was the principal speaker. The 16th Annual Golf Tournament of the club was held at Sand Point Country Club, June 5. Herbert A. Boring was chairman of the event.

The Electric Club of Portland—Met May 9 to hear Arthur Schanuel, NAWB field representative, on subject "Wire For Adequacy and Everyone Profits." George Sutherland, president of the Contractors' Assn. was chairman of the meeting. This meeting replaced the regular meeting of the association, but did not affect the regular meeting of the Electric Club, held Thursday noon, May 11, at Congress Hotel.

Electrical Maintenance Engineers' Assn.—Will hold June meeting on the 20th. Subject of discussion will be "Explosive-Proof Equipment."

Wholesalers will hold their annual summer meeting at Del Monte, June 15-17, according to Fred Todt, General Electric Supply Corp., Los Angeles, chairman of the Pacific Division, National Electrical Wholesalers Assn., and Albert N. Elliot, secretary.

# "I'D HATE TO LET MY BEARD GROW 'TIL THAT ENGINE QUITS!" SAYS ENGINEER C. W. HAM

"IT WAS A GOOD ENGINE IN THE FIRST PLACE," says Mr. C. W. Ham, Diesel Engineer for Western Engine Corporation. "We built it ourselves and put it in operation in 1926. It's a stationary solid-injection engine that furnishes us power in rush times 24 hours a day and during its life has never let us down.

"It's still in good shape and produces power for our entire plant at less than the low city rate we could get.

"But the best engine ever built needs good fuel and lubrication. Every drop of oil this one ever had in the crankcase has been your Shell Talpa Oil. Every drop of fuel that's gone through it has been 'Shell Dieseline.' I don't know how *any* products could beat this perfect record regardless of price."

* * *

Shell appreciates Mr. Ham's bouquets and is proud to have shared in this record. And while we might add that Shell products can't make bad equipment into good equipment, we do believe they will do the best job that can be done in making any kind of equipment run better and last longer.

**Experienced technical men are on call without obligation on all industrial lubrication and fuel problems.**

SHELL

# SHELL INDUSTRIAL LUBRICANTS

# NEWS OF THE INDUSTRY

## PUGET SOUND POWER & LIGHT READY TO FIGHT PUDS

The Puget Sound Power & Light Co., operating in eastern, western, southwestern and the Puget Sound area in the state of Washington, is prepared to throw all its resources into the field to prevent "piecemeal" disintegration of its power system, according to Frank McLaughlin, president of the company.

He said that the company would not only fight recent condemnation proceedings started in several public utility districts (PUDS) in the state of Washington, but would also go to the public with the full story of what is going on behind the scenes to destroy Puget Power as an entity in the state.

The issue was brought to a head by the Whatcom County PUD commissioners late in April, when they launched a $3,250,000 condemnation suit in superior court to obtain all the company's property, including its distribution system in Whatcom County. Previously, Douglas, Chelan, Lewis and Cowlitz Counties had begun similar proceedings.

McLaughlin stated that "his company is now and always has been ready to receive and consider any bona fide offer for its system as a whole, but under no circumstances will it sit still under sniping attempts to cut it into little pieces."

Twelve counties were represented at a meeting of PUD commissioners held in Seattle last month, and according to Guy C. Myers, fiscal agent for the PUD districts, six voted for condemnation proceedings and six for negotiation.

A statement of Puget Power's policy was read at the meeting by R. W. Beck, then Bonneville chief electrical engineer. Written by D. C. Barnes, president of the Engineers Public Service, which owns 99% of Puget Power's outstanding common stock, it read, "If the districts desire to secure data for the purpose of making an offer in good faith for the purchase of the property of the company, we will make data available under certain conditions."

Among the conditions, Barnes stated that the condemnation suits be withdrawn and that all districts must agree not to bring similar actions while negotiations were in progress. "If the districts are sincere in their expressed desire to purchase," Barnes concluded, "I am sure they will see the reasonablness of these conditions and be willing to meet them."

Meanwhile, the Whatcom County suit, filed in superior court, was transferred to the local division of the United States district court. The Cowlitz and Lewis Counties suits were transferred to the Federal Court at Tacoma.

## HOOVER--Not Boulder!

Hoover Dam it will be on the new Rand McNally & Co. maps now in preparation, according to news dispatches from Chicago. Boulder Dam will go in brackets, and Hoover Dam will be the official designation after six years of being ignored.

In checking spellings with the Federal Geographic Service, the map company discovered that the name Hoover Dam had never been officially changed to Boulder. The new maps will show the great dam thus: Hoover Dam (Boulder Dam).

This should please the Los Angeles *Times*, which has always designated the dam by the name of the man who had the most to do with its conception.

## P. G. & E. ELECTRIC RATES REDUCED $2,200,000

The California Railroad Commission announced last month a reduction in electric rates over the entire system of the Pacific Gas and Electric Co., saving customers $2,200,000 annually. The new rates, which became effective June 1, are the outcome of a long period of informal discussions, not only with P. G. and E., but with all utilities in the state.

These adjustments will be made over an area which includes most of the California cities from Bakersfield to Eureka. It was pointed out by Ray C. Wakefield, president of the Commission, that the adjustments will take place without discrimination between communities. The new savings, when totaled with reductions made in electric rates since 1936, amount to $9,300,000 on an annual basis. Spread of the latest reduction over different classes of customers will be announced by P. G. and E.

## BANKS APPOINTED NEW BONNEVILLE HEAD

Secretary of Interior Ickes announced last month in Washington that Frank A. Banks, construction engineer in charge of Grand Coulee Dam, would succeed the late J. D. Ross as administrator of the Bonneville power project. Banks several days later resigned his post at Grand Coulee.

The new acting head is a graduate of the University of Maine in civil engineering and has been employed continuously by the Bureau of Reclamation since 1906. In 1917, he became construction engineer of American Falls Dam in Idaho, and in 1920 he went to the Owyhee project in Oregon as construction engineer of the great Owyhee Dam, then the foremost engineering structure in the world.

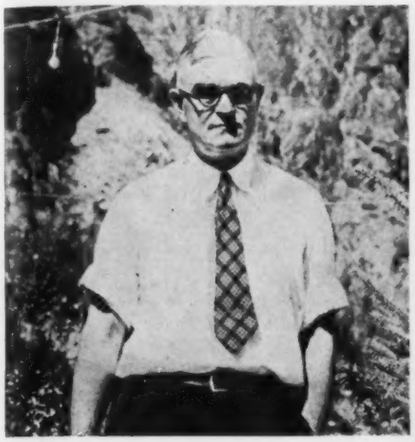
When the Grand Coulee Dam project was begun in 1933, Banks was assigned to the job of construction engineer and he has supervised the work there since that date. He has been closely connected with the Bonneville project since the Authority was established in 1937, and in serving as representative of the Interior Department on the three-man advisory board to the project administrator, has gained intimate knowledge of the policies and plans developed by Bonneville officials.

Banks has taken up his duties at the Portland office with the assurance that he will study carefully electrical problems of the area and that he will speed the sale of Columbia River power to communities along the transmission network now under construction.

In regard to the activities of public utility districts, Banks has offered to assist in every way in the sale of Bonneville power to them. He said he was taking no stand in regard to the methods used by districts in acquiring their distribution systems for marketing Bonneville power. "I think that is their business," he stated. "While their action will have a very material bearing on the success of the project, we must remember they are separate municipal organizations and should be able to handle their own affairs."

"New industries can use large blocks of Bonneville power," Banks said. He promised that he would make studies so that specific industries could determine whether it was feasible to establish factories in the area.

"Our business is selling power," he



BANKS

pointed out, "and naturally we will do all we can to encourage industries to use this power. It seems to me, however, that it is up to the cities themselves to do the actual work of contacting industries."

The new administrator said that the basic kw.-yr. schedules for Bonneville power may be supplemented with additional rates which will be submitted to the Federal Power Commission for approval. Customers using power solely for irrigation, he asserted, cannot use the kw.-yr. schedules as advantageously as districts that have both summer and winter loads.

Bids on the construction of the Grand Coulee-Bonneville 230-kv. power line will be opened in Portland June 15.

Secretary Ickes also announced in May the appointment of Barry Dibble as assistant administrator under Banks. Dibble, who worked with the new Bonneville chief on Snake River projects in Idaho during the last years of the World War, will handle power sales. J. H. Miner, reclamation bureau engineer at Grand Coulee, became acting construction engineer there with the resignation of Banks on May 9.

Another change in the Bonneville personnel occurred in May when the Secretary of Interior dismissed R. W. Beck as chief electrical engineer of the huge Columbia River project, on grounds of insubordination. Beck, who had been one of Ross's chief aides, one week later took over the post of consulting utility engineer of public utility district No. 1 at Grays Harbor, Wash.

TWO ADDITIONAL GENERATORS, which will have a rated capacity of 82,500 kva., were ordered in May by Secretary of Interior Ickes for the power plant at Hoover Dam. The contract was awarded to the Westinghouse Electric and Manufacturing Co., on its bid of $1,454,700.

Plain Hoss Sense
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REG. U.S. PAT. OFF.
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**CONGRATULATIONS**
**P.C.E.A. MEMBERS!**

- Much of the progress of the Electrical Industry in the West has been due to the splendid work done by members of the various committees of the Pacific Coast Electrical Association.

- Whether you were fortunate enough to personally participate in the discussions at Pasadena or were "carrying on" at home, you can be proud of the Industry's progress and the part you have contributed to its growth.

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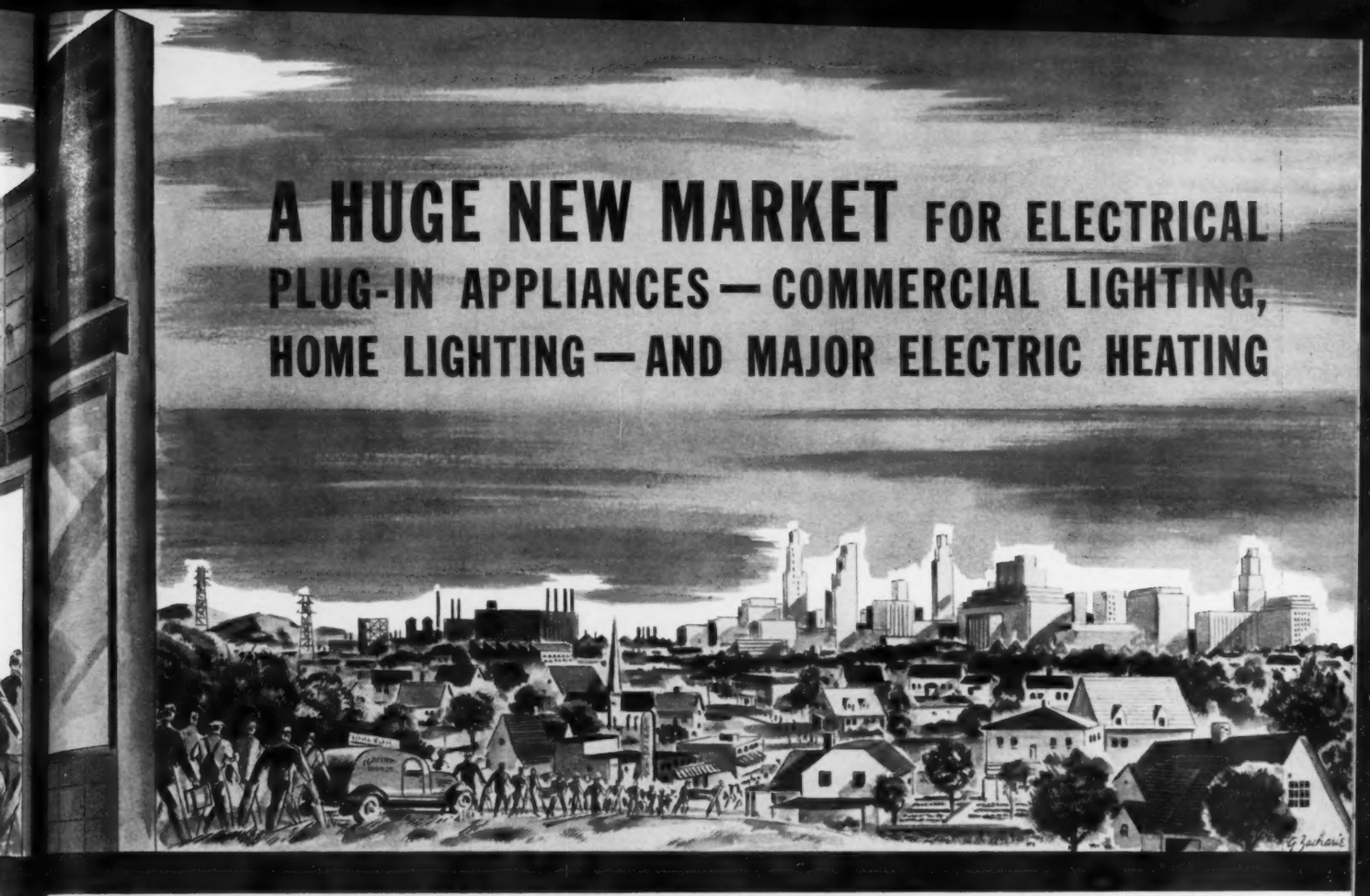
# THE NEWS IS OUT!

**Effective July 1, the Pacific Gas and Electric Company will make its *fifth* electric rate reduction since 1928—a saving to customers of approximately $2,200,000 annually.**

**Aside from the personal savings involved, remember that so long as a rate reduction is *news*, it can be used by appliance dealers to stimulate business.**

**Play it up! Carry a display line about reduced rates in all your advertising. Use it to attract attention, and more important, to show that cheap electricity is here—*now!* That whatever the case may have been years ago, or may be today in other localities, P.G.&E. customers may use electricity freely, without being in the least extravagant.**

**As to specific appliances, major electric heating is *now* a greater bargain than many people believe, and with reductions in our third domestic rate block it will be cheaper still. *Bring this out!***




**Bring out also the fact that ranges, water heaters, ironers, everything that might be operated on third-block electricity, is now cheaper than ever.**

**Another opportunity comes through a reduction in the *first* domestic rate block. In this case, the saving is to our low-use customers who together constitute a broad, mass market for improved lighting and small appliances.**

**Still another reduction is being made in the commercial lighting rate—a particularly important change in view of the current trend toward modern storefronts, windows and interiors. Many commercial prospects are already half-sold and should certainly succumb to a presentation based on the new rates.**

**Whatever you sell and regardless of your customary methods, don't fail to make use of this coming rate reduction. Cheaper electricity is soon taken for granted. The time to talk about it is while it is still live news!**

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Niagara Electric Improvement Corp.
CABLE GRIPS
Kellems Products, Inc.
CONNECTORS, GROUND ROD CLAMPS, UTILITY HOISTS
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GROUND LINE POLE TREATMENT
Osmose Wood Preserving Co.
METER JEWELS
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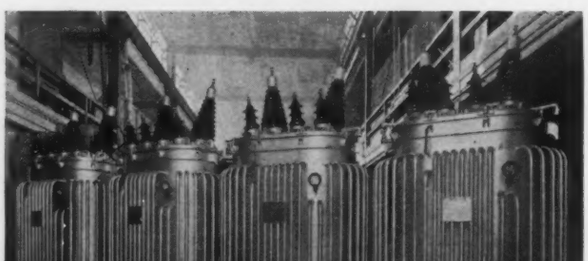

Four 500-kva, 33,-000-volt GARDNER power transformers installed by the PACIFIC GAS and ELECTRIC COMPANY in one of the North Bay Communities.

Where continuity of service is essential, utilities are turning to GARDNER TRANSFORMERS—trouble-free—dependable—built to operate at peak efficiency.

When you specify Gardner Transformers, you can be sure of continuous service. Our thirty years experience in the construction of transformers is your guarantee of dependability.

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**GARDNER**

ELECTRIC MANUFACTURING COMPANY

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## San Francisco Voters Defeat Municipal Ownership

By an overwhelming vote of 2.5 to 1, San Francisco electors defeated a $55,-000,000 revenue bond proposal to put the city in the power business in a special election May 19. Unofficial returns were: yes, 49,843; no, 121,895, the total being the largest ever cast in a special election. A second ballot measure granting salary increases to municipal employees was defeated by an even greater margin.

This was the eighth consecutive defeat since 1927 for measures aimed at establishing municipal power distribution in San Francisco, all of which involved disposal of by-product power from the city's Hetch-Hetchy water-supply system. This power has been distributed by Pacific Gas and Electric Co. under an agency agreement which has been held invalid in the Federal court as a violation of the Raker Act, the congressional measure which gave the city its original water rights.

Oral arguments on an appeal from this decision were held in the Appellate Court on the same day that the election was held. Attorneys for the city contended that precedent for the present method of disposing of the power existed in a similar agreement under which Los Angeles disposed of power from its water supply system prior to 1921. City officials have stated that in case of an adverse decision, the suit will be carried to the U. S. Supreme Court.

In the mean time statements have been made that the municipal ownership proposition may be submitted again in the November general election. Business interests contend that the best solution to the problem is amendment of the Raker Act.

A PRE-CONVENTION tour of Los Angeles is being arranged by the Illuminating Engineering Society, Southern California Chapter, to entertain Eastern visitors to the convention in San Francisco, Aug. 21-25 en route to the convention. Frank Hansen heads a committee which has planned motor sightseeing tours and a visit to movie studios, Aug. 17 and 18.

CONSTRUCTION of 400 mi. of power line to serve rural residents of Lincoln and Adams Counties is planned by the Washington Water Power Co. this summer, Kinsey Robinson, president, announced last month. The company expects to spend about $400,000 in expansion of its rural service. The new lines will be built at a cost of about $800 a mile.

## Parker-Phoenix Power Line Appropriation Voted

An appropriation of $4,000,000 for construction of a power transmission line from Parker to Phoenix to bring Colorado river electric energy into the Sat River valley has been voted by the U. S. Senate. This sum includes funds for a substation near Phoenix, an initial expenditure for the installation of hydroelectric units at Parker Dam and the estimated cost of the transmission line, set at $1,300,000. A survey of the 143 mile route between the Central Arizona Light & Power Co. steam plant and the Parker Dam, has been under way since March, under the direction of E. C. Koppen, resident engineer for the reclamation service. Electricity will be taken from the Boulder Dam power lines at that point until the Parker generators are built.

It is estimated that the power line can be built and placed in use by Sept. 1. The constantly increasing demands for power from the Salt River valley make its early construction a necessity, according to John C. Page, reclamation commissioner.

The project is a joint undertaking of the Salt River Valley Water Users' Assn. and the power company, which will repay the government for the installation over a period of 20 years. Although the line will be designed to operate at 154,000 volts when the Parker generators can be placed in use, initial operation will be at 66,000 volts.

Bids for construction of transmission lines from Parker Dam to Phoenix and Blaisdell, Arizona were to be opened June 6 at the Bureau of Reclamation office, Phoenix.

## Edison Repairs '38 Flood Damage

Restoration to service of the Sierra power house of the Southern California Edison Co., damaged in the March, 1938 flood, is now under way. Approximately $35,000 is being expended in the project which will return the plant's 1,000 hp. of generating capacity to the Edison system, according to Fred B. Lewis, vice-president and general manager of the Edison company.

Also included in the work is the reconstruction of the water conduit system of the San Antonio Water Co. and the Canyon Water Co., also damaged by the flood. This conservation measure will enable again full use of the waters of San Antonio Creek for irrigation purposes. Since the storm waters washed away much of the water diversion and hydro-electric generating equipment in San Antonio Canyon, there has been a partial loss of irrigating water down the natural stream bed.

INSTALLATION of 165 new sodium luminaires by Tacoma City Light division, has added three more miles of safeway lighting along Pacific Highway, just south of Tacoma. It is expected that Lacey V. Murrow, Washington highway director, who pioneered the sodium installation several years ago, will continue the sodium lighting from the northern limits of Tacoma for an additional four miles toward Seattle.

## Lake Mead Flood Water Storage Begun

Storage of 1939 flood waters behind Hoover Dam began during May with water rising in Lake Mead at the rate of 20,000 acre-ft. per day. At the beginning of storage the lake held 21,720,000 acre-ft., which was greater by one-third than the amount impounded at the same time last year.

Expected inflow this season may be sufficient to test the dam's spillways. Peak storage in 1938 occurred Sept. 28 when the lake held 23,190,000 acre-ft. This year's peak will be considerably larger, although reclamation commissioner John Page reports that there is no possibility that the lake will be filled. Closing of the 21-ft. spillway drum gates is expected to permit a try-out of the spillways.

Present water stored in Lake Mead represents five years' dependable irrigation supply.

ELECTRIC LIGHT and power rates in parts of Weld County served by the Colorado Central Power Co. were reduced June 1, according to E. E. Wheeler, chairman of the State Public Utilities Commission. Annual savings amounting to $6,000, principally for residential consumers, are in line with recent cuts by the same company in the Denver area.

A BILL in the Oregon legislature that would have set up a fee system for electrical inspection in connection with the existing state electrical inspection law, ran into difficulties. The bill would have provided funds by which more inspection could be done in rural areas. After having passed both houses of the legislature it was discovered to have a defective title and the governor refused to sign it. It was re-introduced and went through a second reading two days before adjournment. During the last two days one of the senators died and subsequent conditions prevented the bill from coming up for passage.

## $200,000 Rate Reduction in Spokane Promised

A general reduction in electric light and power rates, estimated at $200,000 a year, was promised Spokane consumers by officials of the Washington Water Power Co. it was announced recently. The promise was made prior to the granting of a new 25-year franchise for distribution of electrical current in Spokane.

This franchise was awarded to the Spokane Central Heating Co., a wholly-owned Washington Water Power subsidiary. A supplementary agreement provides the franchise is to be assigned to the Washington Water Power Co. on July 1.

The cost of illuminating residential street lights has been reduced from $37 to $30 for each light. In addition, 425 new street lights are to be installed without cost to the city during the next four years.

The cost of illumination of downtown curb lights has been cut 25%, from $60 to $45 per light. The entire residential street lighting system is to be modernized at an average cost of $30 per light at the expense of the Washington Water Power Co.

UNIFORM ESTIMATING pads have been developed by the San Francisco Electrical Contractors Assn., for all members. Pads are so arranged that all items on a bid form are arranged in logical order. One pad is provided free to each member and others furnished at cost of 75c per pad. Uniform forms have been found necessary for reviews of jobs under arbitration.

## Sierra Snow Runoff Figures Greatly Reduced

Figures published in the early April Sierra Nevada snow survey bulletin have had to be considerably reduced, it was announced in May by the California State Department of Public Works. The reductions are greater in the north where there was a more severe deficiency in April precipitation, and not so great toward the south where more precipitation was received.

The overall reductions amount to 17% of the figures published in April, which reduces the overall expectancy of April-July run-off from 48% of normal to 40% of normal.

At the Kings River watershed, precipitation is high at 77% of normal; with Upper San Joaquin, 68%; Upper Sacramento-McCloud and Pit, 60%; American, 59%; Yuba, 57%. The Feather River watershed figure was low at 46% of normal.

## Edison Launches Big Construction Program

Construction of a major transmission line and substation to bring Hoover Dam power to Orange County was begun May 8 by Southern California Edison Co. Expenditures of approximately $2,500,000 will be made to complete the line and station for delivery of power Oct. 1, according to Fred B. Lewis, vice-president and general manager.

First work on the project, being constructed by Stone & Webster Engineering Corp., has started at the 40-acre site of a new major substation, to be designated as Barre, near Stanton, the center of Orange County's highly developed section. Cost of the station will be approximately $1,500,000. The 220-kv., 27-mi. transmission line from Chino to Barre substations will cost nearly $1,000,000. This will be the sixth major 220-kv. line on the Edison system. Twenty miles of it will be in Orange County, the rest in San Bernardino County.

The site of Barre substation is on the Los Alamitos branch of the Southern Pacific railroad. A 1,600-ft. spur to the substation will be built for handling heavy equipment.

The substation building will be steel and concrete. Much of the equipment will be outdoor type, including a 70,000-hp. synchronous condenser. Capacity approximating 80,000 kva. will supply nine 66-kv. circuits to distribution substations including Katella, Fairview, Fullerton, La Habra, Atwood, Ocean View, Irvine and Los Alamitos substations.

Edison generating facilities of 220,000 hp. are now being installed at Hoover Dam. The first unit will be ready for service in July and the second about Oct. 1. Edison has completed its 223-mi., 220-kv. transmission line from Boulder Dam, and Chino receiving station is nearing completion. Approximately $4,375,000 has been expended to build the Hoover line and install facilities at Chino.

A PROPOSED city charter amendment to permit construction of a municipal power plant was defeated in a heated special election at Montrose, Colo., on April 25th. The vote, the largest in Montrose history, climaxed a bitter six-weeks campaign in which the Western Colorado Power Co., now serving Montrose and its surrounding western slope territory, opposed the municipal ownership faction led by Mayor A. B. Pinkstaff.

## Hoffman to Head Seattle City Light

Eugene R. Hoffman, assistant regional director of the Public Works Administration, formerly an engineer of the Seattle Park Department, has been named to succeed the late J. D. Ross as superintendent of Seattle City Light Department. He will serve the unexpired term of Ross, which ends December 31, 1941.

As assistant regional director of the PWA, Hoffman has directed the PWA program for Washington, Oregon, Idaho and Alaska, and has been in close touch with Seattle's City Light Department. Construction of the Ruby Dam on the Skagit River, and the new transmission lines from the Skagit to Seattle were financed largely by PWA funds.

Hoffman was employed from 1927 to 1932 by the City of Seattle as park engineer, but in 1933, he became a construction engineer in the Washington state highway department. Resigning this position, he accepted an appointment as state engineer for the Federal Emergency Administration of Public Works for the state of Washington. He later became state director, and in November, 1937, when the state offices of the PWA were consolidated into regional offices, Hoffman became assistant regional director.

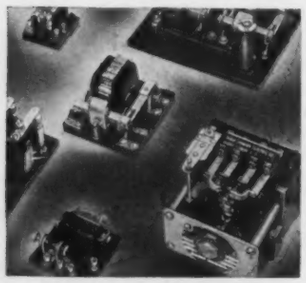
"The policies of J. D. Ross will be my policies," Hoffman stated. "Through his tremendous energy and loyalty, J. D. built up a great utility for the benefit of the people of Seattle, and I will endeavor to the best of my abilities to carry on his program."

The new superintendent said that he had been following with keen interest research into new uses of electrical energy, particularly in relation to industrial development.

THE SEATTLE CITY COUNCIL last month adopted a resolution changing the name of Ruby Dam of Seattle City Light's Skagit project to Ross Dam, as a tribute to the late J. D. Ross. To permit thousands of his friends to participate in financing a memorial to be erected to him on the Skagit project, arrangements have been made by friends of City Light to receive contributions.

PRODUCTION AND CAPACITY data by ownership and type of prime mover is shown for the first time in the Federal Power Commission report on production of electric energy in 1938. Interstate movement of electric energy is also included for the first time. This complete and comprehensive study lists installed capacity by states, geographic divisions and class of ownership.

WARD LEONARD Relays are economical to purchase and to operate. Current carrying parts are generous in section to prevent generation and power loss. The good wipe movement and silver-to-silver contacts are reasons why Ward Leonard Relay contacts stay bright and do not pit or stick. They always give a crisp make and break.



Line includes Heavy Duty, Intermediate, Light Duty and Sensitive Relays for time, temperature and pressure control.

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## COMBINATION AUTOMATIC STARTERS

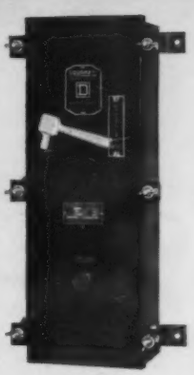
Combination with Disconnect Switch

Combination with Circuit Breaker

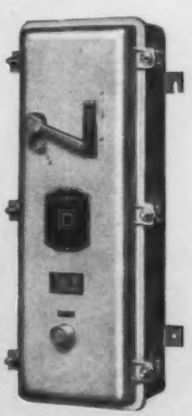
## FOR LOWER INSTALLATION COST

**COMBINATION AUTOMATIC STARTERS have important advantages over other types of electrical installations—for new industrial plants or for the modernization of the old. They save in mounting space; they save in wiring cost because the internal wiring is done by the control manufacturer; they can be moved as a unit from one location to another; they permit remote control from push buttons on the driven machines; the cabinet cover is interlocked with the disconnect for greater safety.**

**SQUARE D COMBINATION STARTERS are supplied with either circuit breaker or disconnect switch, fusible or non-fusible. The magnetic starters operate vertically and will not close accidentally from vibration or shock. They will rupture the stalled rotor current of the motors for which they are rated. Fuses or breakers provide short circuit protection. Combination starters can be supplied in general purpose, dust-tight and water-tight enclosures for motors rated up to 30 H.P., 220 Volts or 50 H.P., 440-550 Volts.**



Dust-tight enclosure



Water-tight enclosure

**SQUARE D COMPANY**

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**CALL IN A SQUARE D MAN**

## Program Set for AIEE Summer Convention

The West will play host to the nation's electrical engineers June 26-30, when the AIEE will meet in summer convention with headquarters at the Fairmont Hotel atop Nob Hill in San Francisco. Just twenty minutes away is Treasure Island, the World's Fair. Within a radius of a few miles are a dozen engineering projects for delegates to see.

In such a setting, S. J. Lisberger, general chairman, and his committee have arranged a program which will enable visitors to participate in technical meetings of exceptional interest and still have ample time to exploit the many opportunities for recreation.

Lisberger will open the convention on Monday, and P. M. Downing, past vice-president of the Institute, will welcome delegates. National officers will speak and awards will be made. A conference and sports are scheduled for Monday afternoon, with a tea for men and women in the Mark Hopkins Hotel at 5 p.m.

Technical sessions will get under way Tuesday morning, and Tuesday will be AIEE day at the Exposition. Dinner will be at the swank Yerba Buena Club on Treasure Island.

More technical meetings are scheduled Thursday, and Friday morning, with sports programs Wednesday and Thursday afternoons and inspection trips Friday afternoon. Convention banquet and ball will be Thursday night.

Technical meetings will be parallel as follows:

**Tuesday, 9 a.m.**

1. Power Generation and Transmission.
2. Communication, Electronics and Basic Sciences.
3. Instruments and Measurements and Automatic Stations.

**Thursday, 9 a.m.**

1. Protective Devices.
2. Joint Communication Session (with IRE).
3. Electrical Machinery.

**Thursday, 2 p.m.**

1. Conference on Teaching of Communications and Electronics.
2. Conference on Sensitive Ground Protection.

**Friday, 9 a.m.**

1. Transportation and Lighting.
2. Research and Cables.
3. Industrial Power Applications.

Westerners will figure prominently in these meetings. Their presentations will include the following papers:

Tuesday: "Mingled Hydro and Steam Power Production in California", A. H. Markwart, PG&E; "Ionization Time of Thyratrons", A. E. Harrison, Cal Tech; "Surge Voltage Breakdown Characteristics for Electrical Gaps in Oil", R. W. Sorensen, Cal Tech; "Some Practical Measuring Devices", Lloyd F. Hunt, So. Cal. Edison.

Thursday: "The Klystron as a Generator of Very Short Waves", W. W. Hansen, R. H. Varian, D. L. Webster and J. R. Woodyard, Stanford.

Friday: "Signal System, Interlocking Plants and Automatic Train Control on the San Francisco-Oakland Bay Bridge Railway," C. R. Davis, State Public Works Dept.

Working with Lisberger in arranging this fine program have been: D. I. Cone, vice-chairman; George C. Tenney, secretary; R. O. Brosemer, treasurer; M. S. Barnes, registration; R. J. Cobban, sports; E. A. Crellin, hotel; Howard Flye, entertainment and reception; F. R. George, trips and local transportation; J. S. Moulton, publicity; Stanley Rapp, transportation; H. H. Skilling, student activities; S. C. Smith, program, and Mrs. S. J. Lisberger, ladies' entertainment.

HYDROELECTRIC POWER from the Kerr project on Flathead River flowed through the Montana Power Co.'s transmission lines on May 20. Completed last fall, the project is one of the largest constructed in recent years.

INSTEAD OF LIMITING its annual report for 1938 to a recital of financial results for the year, the Utah Power & Light Co. has included sections devoted to customers, employees and the general public as well. The responsibility toward customers of the company is summarized in one phrase: "An adequate, complete service at lowest possible cost." G. M. Gadsby, president, comments that a private utility is obligated to give the customer "more than a supply of energy delivered outside his house."

## Public Utility Preferred!

"This request is a bit out of the ordinary," said E. E. Wheeler, chairman of the Colorado Public Utilities Commission, when residents of the Uncompahgre Valley recently told the commission that they prefer a private utility to the REA because they fear the government agency will raise their electric rates.

A petition, signed by 116 consumers residing near Delta, asked that the state body use its authority to require Western Colorado Power to continue its service.

The petition said the utility gives the consumers a minimum rate of $2.50. They are afraid this will be raised to $2.75 if the REA provides them with electricity.

## Central Arizona Power To Spend $400,000

Electric consumers served by the Central Arizona Light & Power Co., increased by 1,301 or 5% during 1938, company officials announced. The utility also last year expended $828,064 for plant additions and improvements, while plans for a proposed construction program this year include the addition of a new 2,000 kva. unit-type substation to serve northwest Phoenix.

Additional capacitors in the electric distribution system and expenditures for extensions and improvements will amount to about $400,000.

A NEW CITY ORDINANCE adopted by the Burbank, Calif., city council prohibits "floating masters" for electrical concerns. Each company must have one master electrician to supervise installations made by journeymen and apprentices.

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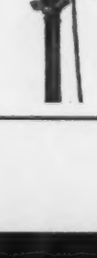
Stevens Sales Co., 41 P. O. Place, Salt Lake City



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## Mountain States Power Speeds Reorganization

To expedite reorganization of the Mountain States Power Co., a new plan has been submitted to the SEC by the company and the preferred stockholders committee in which the terms are more favorable to the latter group. Under this modified plan security holders and claimants against the company would be treated as follows:

Holders of both 5% and 6% bonds would receive new 20-year 5% first mortgage bonds of equal principal amount. Holders of the present preferred stock would receive all of the new preferred and 106,088 shares of new common stock; Standard Gas & Electric Co. for its open account and three-fifths of the now outstanding common would receive 140,614 shares of new common. Holders of present common other than Standard would receive one share of new common for each 20 shares of present common. All other claims would either be paid in cash or assumed by the reorganized company.

The Mountain States Power annual report for 1938 states that had this plan been in effect last year, earnings would have been sufficient to meet all operating expenses, taxes, interest and depreciation plus sufficient net to pay the $2.50 preferred dividends, a common dividend of $1.20 and provide an earned surplus of 95 cents per common share.

BIDS FOR THE construction of a third transmission circuit from the Boulder Dam power plant were to be opened June 6 by the Los Angeles Board of Water and Power Commissioners. Specifications call for estimates to be submitted on three parts of the 287,500-volt power line, which is to be 258 miles long. Item 1 covers the distance from the Bureau's receiving station "E" in the San Fernando valley to its switching station near Victorville. Item 2 is from the Victorville station to the station at Silver Lake, near Baker, while Item 3 extends from Silver Lake to the switch rack at Hoover Dam (Boulder Dam).

CIVIL SERVICE examinations will be held June 15 for the position of supervising electric utilities engineer for the California Central Valley's project, according to Louis J. Kroeger, executive officer of the California state personnel board. Tests for the position which carries a salary of $425 to $500 per month, will be held in Sacramento, San Francisco, Los Angeles, San Diego, Fresno and Eureka.

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P. G & E. OFFICIALS announced last month that they had no immediate plans for further power development on the north fork of the Kings River. A recent execution of a permit from the Federal Power Commission was made for completion of the existing Balch unit, but A. H. Markwart, vice-president in charge of engineering, declared that the permit was filed by the San Joaquin Light & Power Corp., and since then many factors have developed which make it unadvisable to continue the project now.

## REA Activities

The Northern Idaho Rural Electrical Rehabilitation Assn., serving customers in Bonner and Boundary Counties, is planning to provide its own power by development of a site two miles from the outlet from Priest Lake on Priest River.

It is estimated by Allan Sickler, local REA engineer, that the dam, power plant and transmission lines will cost approximately $200,000.

It is also estimated that 1,500 hp. can be produced at the site. The Assn. now buys its power from the Mountain States Power Co.

ROOSEVELT COUNTY ELECTRIC MEMBERSHIP CORP., Portales, New Mexico, has awarded a contract to the Uvalde Construction Co., Dallas, Texas, for building 111 mi. of line, $89,496.

MORGAN COUNTY RURAL ELECTRIC ASSN., Fort Morgan, Colo., has been allotted $325,000 to build 193 mi. of line in Morgan, Weld and Washington counties.

DELTA-MONTROSE RURAL POWER LINES ASSN., Delta, Colo., has been allotted $179,000 to build approximately 160 mi. of line in Delta and Montrose counties.

UNION RURAL ELECTRIC ASSN., Brighton, Colo., has been awarded $320,000 to build about 346 mi. of line in Boulder, Adams, Jefferson, Gilpin and Weld Counties.

WHEATLAND RURAL ELECTRIC ASSN., Wheatland, Wyoming, has received an allottment of $12,000 to build 12½ mi. of line in Platte County.

RURAL ELECTRIC CO., Pine Bluffs, Wyoming, has been awarded $234,000 to build about 196 mi. of line in Laramie County, Wyoming; Weld County, Colo., and Banner County, Nebr.

MOON LAKE ELECTRICAL ASSN., Mt. Emmons, Utah, has awarded to W. W. Clyde & Co., Springville, Utah, a contract for construction of 50 mi. of rural electric transmission lines, Duchesne and Uintah Counties.

SOUTHEAST COLORADO POWER ASSN., Lamar, Colo., has been allotted $2,500 to finance house-wiring. The project previously had been awarded $533,000 to build 480 mi. of line in Prowers, Bent and Otero counties.

CHELAN COUNTY (Wash.) Electrification project has tentatively received approval for a $75,000 fund to include construction of 38 mi. of line in the Prin, Chumstick, and Eagle Creek Districts.

MOUNTAIN EMPIRE ELECTRIC COOPERATIVE, Campo, Calif., have been awarded $79,000 to build about 64 mi. of line in San Diego County.

HIGH LINE ELECTRIC ASSN., Paoli, Colo., have been allotted $122,000 to build about 100 mi. of line in Phillips and Sedgwick Counties, Colo., and Chase County, Nebraska.

PUBLIC UTILITY DISTRICT No. 1, Ellensburg, Wash., has been awarded $151,000 to build about 127 mi. of line in Kittita County.

## Contracts Awarded

TO WEST COAST CONSTRUCTION CO., Seattle, for construction of four towers for power lines from Bonneville dam powerhouse across Columbia River to Washington shoreline. $30,115.

TO F. ZIEBARTH, Long Beach, for construction transmission line crossing towers for Columbia-Willamette River crossings, near Portland, stringing conductor, airway markings, $253,000.

TO RADELFINGER BROS., San Francisco, for electrical work on the San Francisco Junior College Science building, $124,315.

TO G. H. ARMSTRONG, San Francisco, for electrical work on Marina Junior High school auditorium, $11,900.

TO STONE & WEBSTER, Los Angeles, for construction of substation for Southern California Edison Co. at Stanton, and a 27-mile transmission line from Stanton to Chino substation; total cost approximately $1,500,000 and $1,000,000 respectively.

TO ALLIS-CHALMERS MFG. CO., for installation of transformers, air break switch, disconnecting switches, 16 synchronous motor control cubicles and one relay board, circuit breaker, lighting arrester, capacitors, current limiting reactors, for pumping plants, No. 1, 2, 3 and 4, Contra Costa canal, $21,440.

TO PENNSYLVANIA TRANSFORMER CO., Pittsburgh, for three 4,000-kva., outdoor transformers for Raymond, Wash. substation, Bonneville project, $40,956.

TO BETHELEM STEEL CO., San Francisco, for steel reinforcement bars weighing 4,435,000 lbs. for use at Grand Coulee Dam, $114,091.

TO GENERAL ELECTRIC CO., Los Angeles, for purchase of feeder voltage regulators for Los Angeles Water & Power Co., $89,340.

TO J. O. JORDAN & SONS, Boise, for construction of warehouse, one story building and garage for Idaho Power Co., $70,988.

TO BENNETT & TAYLOR, Los Angeles, for 158 mi. of rural electric distribution lines for Idaho County Light & Power Co., $128,983.

TO FRANK ELECTRIC CO., Hayward, California, for installation of a street lighting system at Hayward, $21,768.

TO VINSON & PRINGLE, Phoenix, for construction of hydro-electric power plant on All-American Canal, 15 miles east of Calexico for the Imperial Irrigation District. Installation of radial gates, structural and misc. steel work, $285,356.

TO BENNETT & TAYLOR, Los Angeles, for 103 miles rural electric district system, at Roseburg, Oregon, $79,998.

TO ALLIS-CHALMERS MFG. CO., Milwaukee, for all milling machines and plant equipment in the new $750,000 modern flour mill of Centennial Flouring Mills Co., Spokane, $150,000.

TO INDUSTRIAL ELECTRIC CO., Seattle, for installation of two Diesel engine generator units at Chehalis, Wash., $12,035.

TO T. Y. MCCLELLAN, of West Staten, Oregon, for construction of a 35-mi. public utility district rural electric power extension line, in Cowlitz County, near Longview, Wash.

**Stocks at San Francisco**
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# TRADE NOTES

## Dealers and Distributors

COOK-NICHOLS Co., San Bernardino, Calif., jobbers of electrical supplies, fixtures, appliances and radio equipment, have announced that they have taken over the San Bernardino branch of Williams & Klentz. They will continue to run this new addition as a branch office, with M. Birt, in charge, assisted by Cecil Yates.

Philip Kirkley will handle the fixture department, with Ira Harris, covering local business and N. A. Rippengal, outside territory.

V. J. MORRIS, in electrical merchandising in Spokane for 14 years, opened his own store last month in Spokane at W515 Sprague. The firm, to be known as the V. J. Morris Co., will retail electric ranges and refrigerators, washing machines and all electrical appliances, including radio equipment.

Morris has been manager of the electrical appliance department of the Palace department store for the past seven years. He will be assisted in his new business by L. A. Morris, Messrs. Coffin and Martin, sales staff; and a fully-equipped service department manned by John Barnes, Dean McLaughlin and Victor Haddad.

IRWIN & BELLAH, of 110 E. Philadelphia st., Whittier, Calif., have opened a new branch electrical and gas appliance store at 2401 West Whittier Blvd., Whittier.

CHAS. J. WOLFE RADIO SERVICE has taken over the Brooklyn Radio Exchange at 1953 South Brooklyn Ave., Los Angeles, and have opened a radio and electrical repair store at 1957 South Brooklyn Ave. Chas. J. Wolfe is the new proprietor.

HARPER-MEGGEE Co., wholesale distributors in Seattle, Portland and Spokane have taken on the distribution of Ironrite ironers for the northwest.

A SOLID CARLOAD of vacuum cleaners shipped to the coast is news. Landers Frary & Clark, New Britain, Conn., made that news last month for one of its popular models according to Fred W. Porter, San Francisco representative.

THE HART MFG. Co., manufacturers of "Diamond H" Switches, has announced that the company is now represented in the Northwest by the Robinson Sales Co., with offices at 3215 Western Ave., Seattle, and in Portland, at 733 N. W. Everett St.


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# ABOUT PEOPLE

## L. A. Lewis Becomes Spokane WWP Manager

Lewis A. Lewis, assistant general manager in charge of sales of the Washington Water Power Co. has been advanced to the position of manager of the Spokane division, according to an announcement last month by J. E. E. Royer, vice-president and general manager.

Lewis will fill a vacancy that has existed since the death of R. B. Childs. Prior to Mr. Child's death, the company was organized with two assistant general managers, one in charge of sales, the other in charge of the division. The present advancement consolidates the two duties under one head.

Having graduated in electrical engineering at Washington State College in 1908, Lewis entered the utility field immediately. His 31 years of service has taken him into engineering, construction and then into sales. He has been residential and industrial sales executive, assistant commercial manager, general sales manager and then assistant general manager in charge of sales.

Lewis also serves at present as assistant general manager of the Spokane United Railways, a director of the Washington Water Power Co., and is secretary of the Inland Empire Electrical Equipment Assn. He is a past president of the Northwest Electric Light & Power Assn.

## Edison Names New Assistant G. M.'s

Executive changes in the Southern California Edison Co., effective May 1 were announced by Fred B. Lewis, vice president and general manager. Appointed assistant general manager, was C. E. Houston, former commercial manager. The sales, commercial and division managers will be under his supervision.

E. R. Davis, also appointed an assistant general manager, will have charge of the purchasing, right-of-way, medical, claim and employment departments. R. R. Walbridge, former assistant commercial manager, is now commercial manager.

F. E. YOUNG, JR. has been appointed apparatus and supplies sales manager of the Salt Lake City Branch of Westinghouse Electric Supply Co., it was announced by E. J. Duggan, branch manager there.

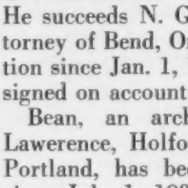
BEAN

## Bean Heads Oregon P. U. Commission

Ormond R. Bean, city commissioner of Portland, Ore., was appointed Oregon's public utilities commissioner by Governor Chas. A. Sprague last month. He succeeds N. G. Wallace, former attorney of Bend, Ore., who held the position since Jan. 1, 1937, and who has resigned on account of ill health.

Bean, an architect formerly with Lawerence, Holford, Allyn & Bean, in Portland, has been city commissioner since July 1, 1933. He was re-elected in 1936 for a term running to Dec. 31, 1940. However, he has resigned this position to accept the new state job.

J. T. TEMPLETON, former partner in the firm of Colvin-Templeton, San Francisco distributors of Westinghouse refrigerators, has joined the Westinghouse Supply Co. staff in San Francisco as metropolitan sales manager on appliances.



HARRY W. HITCHCOCK, chief engineer of the Southern California Telephone Co. at Los Angeles, has been nominated as vice-president of the American Institute of Electrical Engineers for the southwestern region, which includes California, Arizona and Nevada. He has been with the Southern California Telephone Co. for 15 years, and has been chief engineer for 11 years.

W. J. BERRYMAN has been made assistant manager of the Mine & Smelter Supply Co. in Salt Lake City. He was formerly head of the company's electric department.

W. C. HOLLINGSWORTH, formerly sales manager of Bufords' Electrical Co., Fresno, has been appointed manager of Auerbach's electrical appliance department, Salt Lake City. He was also a former buyer and department manager for Hales' stores in San Francisco and was president of the Fresno Electrical & Gas Appliance Society.

C. P. CULBERT, recently appointed sales manager of the Proctor Electric Co., Philadelphia, visited Denver, San Francisco and Los Angeles last month investigating conditions in the small appliance field.

GEORGE DEATH, Peerless Electric Construction Co., Los Angeles, was selected to succeed Clare Smallcomb, who resigned as president of the Los Angeles Chapter of NECA. At the same time Glenn Arbogast, Herbert Evans and Harry Moore were selected to fill vacancies on the executive committee.

C. E. JOHNSON, formerly manager of the Westinghouse light department in Los Angeles, has been appointed street lighting specialist for the Joslyn Co. of Calif. He will serve California, Arizona and Nevada.

C. J. HAWKS of the Exide Battery Company, Seattle, was named chairman of the Seattle section of the AIEE at a recent election of officers. Glen H. Smith, Seattle City Light Department, was named vice-chairman and A. L. Launder, secretary-treasurer.

FRED G. HAMILTON, manager of operation for the Southern California Edison Co., has announced the following personnel changes: L. C. Grimes, former Montebello district superintendent, is now assistant district superintendent in San Bernardino. H. W. Welton, former San Bernardino assistant district superintendent, is now district superintendent of the Montebello district.

FORMER PRESIDENT HERBERT HOOVER will discuss the contributions of engineering to human welfare at the Engineers' Day celebration to be held at the Golden Gate International Exposition on Treasure Island July 13.

W. W. Bradley is chairman of the committee in charge of the day for the San Francisco Engineering Council, sponsor of the program.

## Kahn Elected G-E Supply Vice-President

Jacob A. Kahn, formerly Rocky Mountain district manager of the General Electric Supply Corp., has been named commercial vice-president of the corporation. Kahn had been district manager in Salt Lake City for 11 years, and was former president and general manager of the Capitol Electric Co. in that city.

He also was one of the organizers of the Rocky Mountain Electrical Co-operative League, predecessor to the present Electrical League of Utah. He held the office of president of the association in its initial year.

CHARLES S. PYLE, assistant sales manager of Hygrade Sylvania Corp., Salem, Mass., has been visiting West Coast jobbers in Los Angeles, San Francisco, Portland and Seattle.

E. N. CALHOUN, sales manager of Edwin F. Wiegand Co., Pittsburgh, spent several weeks on the Pacific Coast surveying market conditions for electric heating equipment.

DAVIS DEBARD, vice president and commercial manager, Stone & Webster, Inc., New York, last month told the San Francisco Electrical Development League many interesting developments in appliance merchandising in Europe. In Scotland, for instance, Mr. DeBard said, electric ranges are loaned to the low income group.

ELLIS VAN ATTA, formerly radio interference engineer, has been appointed superintendent of meters of the Pacific Power & Light Co. Employed in the Pacific company since 1920, Van Atta was engaged in meter testing and repair work, prior to his appointment to the post of radio interference engineer.

AL C. JOY, manager of advertising and publicity, Pacific Gas & Electric Co., was named vice-president of the San Francisco Advertising Club at its election last month. Agnes Barrell, in charge of publicity for Pacific Coast Electrical Bureau was elected secretary of the Ad club.

G. WILLIAM GAHAGAN has joined the staff of ELECTRICAL WEST as assistant editor, succeeding STANLEY SCHULER who resigned to become a member of the editorial staff of "House Beautiful" in New York. Gahagan has been associated with the San Francisco office of McCann-Erickson for the past two years.

CLARK BAKER, as lighting counsellor, and Walter Heston, as industrial engineer, have been appointed by Manager George W. Barker, to the staff of the Pacific Coast Electrical Bureau, Northern Division. Walter W. Ernest has been named as secretary. Clark Baker will continue the educational and promotional work in lighting for which he is widely known and accepted. Walter Heston, former *Electrical World* Pacific Coast editor, will do development and promotional work in wiring, industrial modernization, and commercial lighting.

P. W. THOMPSON has been appointed right of way engineer for the Nevada-California Electric Corp., succeeding C. D. Warner who is retiring after 22 years of service with the company. Thompson joined the Nev-Cal engineering department in 1925 and since 1929 has served as civil engineer.

EUGENE H. MERRILL, chief engineer of the Utah public service commission, was last month elected chairman of the 18th annual conference of state public utility commission engineers to be held in Washington, D. C., in 1940.

## Deaths

RICHARD MERRIWEATHER VAUGHN, 58, former valuation engineer of the Washington Water Power Co., Spokane, and an engineer for the former Seattle Electric Co., died in Seattle on May 4. Mr. Vaughn was with the Spokane company from 1934 until illness caused his retirement last November, when he moved to Seattle. He was born in Lexington, Mo., and was graduated from the University of Missouri in 1903. He came to Seattle in 1906.

BERT R. SHUTT, 58, superintendent of distribution for Puget Sound Power & Light Co., died in Seattle. He had been an employee of the company for 34 years.

LEONARD C. HEALY, 50, for the past 22 years manager of Utah Power & Light Co. at Magna, died suddenly April 4 while at work at his desk. Mr. Healy was born September 25, 1888, in Murray, Utah, and was active for many years in Magna civic affairs.

EUGENE ANDERSON, 58, a pioneer in Arizona electrical development, died May 6 of a heart attack at Casa Grande, Ariz. For 12 years Mr. Anderson had been chief engineer at the Arizona Edison Co. power plant. He helped organize Elroy Electrical District No. 4, and was a director in that organization until last year. Mr. Anderson also helped build the Ashurst-Hayden diversion dam in the Salt River valley.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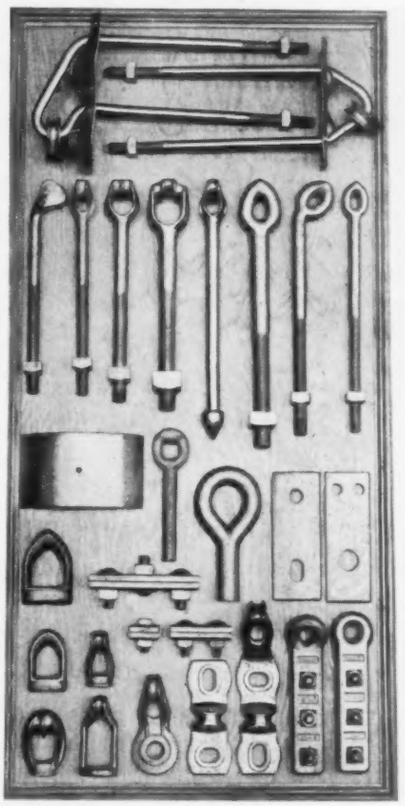

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# PROFILES OF THE MONTH

A. E. Schanuel, of New York, NAWB field representative, is shown illustrating a point at the adequate wiring meeting held April 27 by the Electrical Development League of Southern California. Wholesalers, salesmen, manufacturers' agents and electrical contractors were present in the Edison building auditorium, Los Angeles, to hear Schanuel discuss ways and means of bigger and better wiring jobs. Also appearing on the program were Lawrence Davis, NECA, and R. C. McFadden, Southern California Edison Co.

Carl Heise had just been granted his 40-year service pin from Westinghouse Electric & Mfg. Co., when San Francisco electrical inspectors put him to some capacity tests at a crab cioppino feed they held at the inspectors' shack on Treasure Island. As a member of the executive committee of IAEI, Southwestern section, Carl proved his carrying capacity

Jack Curtwright of the A. B. Chance Co. has been transferred to the Pacific West from the Central States sales staff. He will cover eight states from Washington to Arizona

R. J. Lazarus, formerly located in the Fresno office of P. C. Electrical Assn., is now their northern regional manager with San Francisco his headquarters

Donald Baird, a member of the Boise sales staff, Idaho Power Co., has been named as the outstanding young business man in the city by the Boise Junior Chamber of Commerce

The home service girls of Washington Water Power Co., under the direction of Lucile Ramirez (fourth from the left), are now equipped with special home service cars of sedan truck bodies. Complete with kitchen utensils and modern lighting equipment with which they may conduct home service demonstrations in either cooking or lighting, this group plays an important part in the WWP consumer-educational program. While these girls sell no merchandise, they do open doors for dealers and salesmen, and thereby assist in actual sales